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ANSWERS TO QUESTIONS SUBMITTED BY AMERICAN EXPERTS

Source not indicated OTVETY NA VOPROSY AMERIKANSKIM EKSPERTOV  
ENESBANKOY SOVETSKO-AMERIKANSKOY RABOCHY GRUPPY PO SOTRUDNICHESSTVO  
V OBLASTI NAUCHNOY POLITIKI in Russian, date not indicated, 135 pp  
typewritten

[Typewritten document issued by Joint Soviet-American  
Working Group on Collaboration in the Field of Scientific Policy:  
"Answers to Questions Submitted by American Experts in the  
Soviet-American Working Group on Collaboration in the Field of  
Scientific Policy"]

Section I -- The Federal Role

[Question] 1.1.1. What are the areas of responsibility of the GNT,  
the Academy of Sciences, the Communist Party and other national bodies  
in the formulation of national technology policy?

[Question as translated into Russian, and then retranslated into  
English] What are the areas of responsibility of the GNT, the Academy  
of Sciences USSR, and other state agencies in the determination of  
national scientific-technical policy?

[Answer] The higher agencies of the CPSU -- the party congresses and  
the party's Central Committee -- determine the basic trends in the  
development of science and the most important questions of its organiza-  
tion, which are implemented by agencies of state authority.

The direction of the development of science in the USSR is carried out  
in a centralized, planned procedure by agencies of state authority and  
state administration, which unite and guide the activities of the  
scientific and scientific-technical institutions and organizations.

The activities of the highest agency of state authority -- the Supreme  
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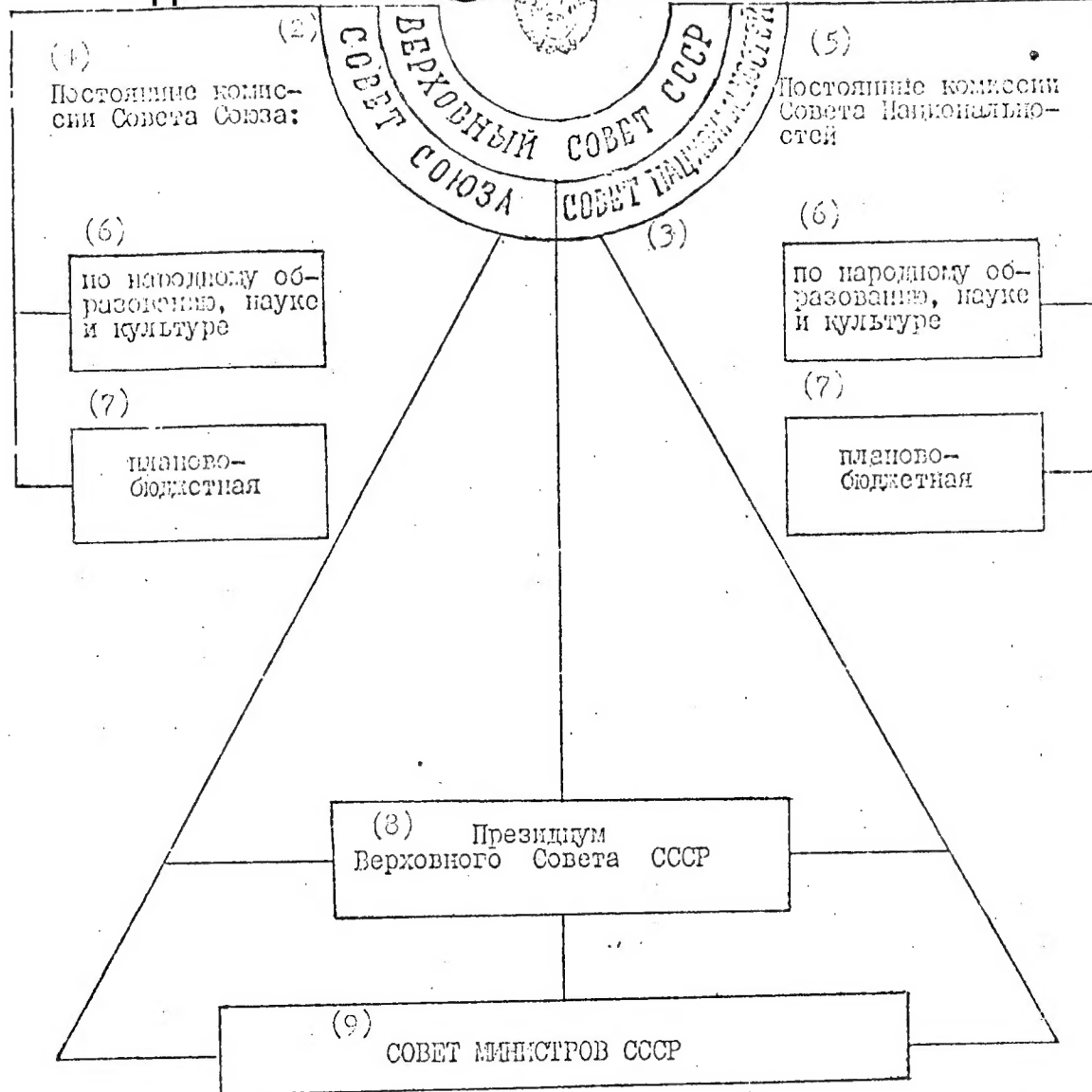
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(10) Органы высшей государственной власти СССР, осуществляющие деятельность в области научной политики

Key:

- |   |  |
|---|--|
| 1. Supreme Soviet USSR                                    | 8. Presidium of the Supreme Soviet USSR  |
| 2. Council of the Union                                   |  |
| 3. Council of Nationalities                               | 9. Council of Ministers USSR   |
| 4. Permanent commissions of the Council of the Union:     | 10. Agencies of the highest state authority in the USSR which carry out activities in the field of scientific policy |
| 5. Permanent commissions of the Council of Nationalities: |  |
| 6. for national education, science, and culture           |  |
| 7. budgetary-planning                                     |  |

In 1966, permanent commissions on national education, science, and culture were formed under the houses of the Supreme Soviet of the USSR -- the Council of the Union and the Council of Nationalities. The permanent commissions prepare draft versions of laws and other legislative proposals for subsequent consideration by the Supreme Soviet; they provide their findings on questions submitted for their consideration; carry out the preliminary study of the appropriate sections of the State Plan for the Development of the National Economy of the USSR and the State Budget of the USSR, and of amendments to them; carry out supervision of the activities of agencies of state administration in the appropriate field, and can require them to submit documents, report materials, and other materials, and to provide explanations from their directors. The commissions enjoy the right of legislative initiative; can make recommendations to the government and introduce to the appropriate house or to the Presidium of the Supreme Soviet USSR recommendations concerning the transmittal of legislative bills and other questions of nation-wide importance to discussion by the entire people, as well as concerning the publication of bills and other legislative proposals for discussion by the public. The commissions' recommendations are subject to mandatory examination by all the state agencies.

The overall guidance of the scientific-technical activity in the country is carried out by the government of the USSR -- the Council of Ministers USSR -- which, as the highest agency of state administration, takes steps to develop science and technology and to introduce their achievements into the national economy; unites and guides the work and determines the competency of the ministries and other departments in this area; establishes the procedure for development and approves the basic trends in the development of science and technology, the state five-year plans for scientific-research projects, and the use of the achievements of science and technology in the national economy as a part of the state five-year plans for the development of the national economy of the USSR, the state annual plans for the use, in the national economy, of the new, most important types of output, technological processes, and automated systems of control which are of importance to the entire nation; approve plans for the financing of scientific-research projects and the training of scientific personnel as a part of the state annual plans for the development of the national economy of the USSR. The government resolves questions of copyright and inventor law, the training of scientific personnel, the payment of labor, and other questions involved in the organization and administration of science.

The government, when carrying out the direction of the development of science and technology, directly relies both upon the system of specialized interbranch agencies of control -- the State Committee on Science and Technology (GKNT), of the Council of Ministers USSR; the State Committee on Construction Affairs (Gosstroy USSR), of the Council of Ministers USSR; the State Committee on Inventions and Discoveries, of the Council of Ministers USSR; the State Committee on Standards, Council of Ministers USSR; and the Higher Attestation Commission, attached to the Council of Ministers USSR. In this group of agencies it is necessary to include the Academy of Sciences USSR and the Ministry of Higher and Secondary Special Education USSR, since their competency in the field of carrying out fundamental and applied research and the training of scientific personnel is of an interbranch nature.

The State Committee on Science and Technology (CKNT), of the Council of Ministers USSR, is an all-union agency that assures, in conformity with Party and Government directives, the carrying out of a uniform state policy in the field of scientific-technical progress and the use of the achievements of science and technology in the national economy. The State Committee on Science and Technology develops proposals for the basic trends to be followed in the development of science and technology in the country; scientific-technical forecasts on the most important problems of the national economy; approves the procedure for the development of branch-level scientific-technical forecasts and the overall requirements for draft plans for enterprises, machinery, and equipment. . . .

[page apparently omitted. Typewritten pages are unnumbered. One page ends with beginning of word "equip[ment]"; next page begins with end of word "[commit]tee."]

. . . . committee also are subject questions of scientific-technical information and the coordination of international scientific-technical links.

Important tasks that are of great importance for the development of the country's national economy are resolved by the State Committee on Construction Affairs, of the Council of Ministers USSR, which answers to the Government for the development of science, the increasing in the effectiveness of scientific research, and the development of the most important, comprehensive scientific-technical problems in the field of construction and architecture, the coordination of scientific-research projects being carried out by scientific organizations and higher educational institutions in the field of construction and architecture, supervision over the introduction of the achievements of science, technology, and advanced experience in the process of planning and construction.

Critical tasks that are of great importance for the development of science and technology are resolved by the State Committee on Inventions and Discoveries, of the Council of Ministers USSR. It carries out the overall direction of the development of invention and the improvement suggestions, the introduction of inventions and discoveries into the national economy; supervises the activities of ministries and departments in this area; protects the state interests in the field of inventions and discoveries that belong to the USSR; organizes boards of experts to give findings on inventions; issues originator's certificates [type of Soviet patent] and patents for inventions, and certificates [diplom] to persons making discoveries; maintains state registers of inventions and discoveries; and protects the inventors' originator rights. An Experts Division operates under the Committee for the purpose of providing expert findings on the most important inventions and discoveries, and to consider questions involving the methodology and practice of use of inventions. The basic questions pertaining to inventions and improvement suggestions are regulated by the statute approved by the Council of Ministers USSR -- Statute Governing Discoveries, Inventions, and Improvement Suggestions -- and by the Instructions governing compensation for them.

The work on standardization, which plays an important role in the acceleration of technical progress, is directed by the State Committee on Standards, of the Council of Ministers USSR (Gosstandart USSR). Its most important tasks are the organization of work to execute the assignments of developing state standards, and their confirmation; state-wide inspection of introduction and observance of standards; and general direction of the work of standardization in the branch agencies.

The Higher Attestation Commission, attached to the Council of Ministers USSR approves the decisions of the Learned Councils concerning the awarding of learned degrees and learned titles.

Other central interbranch agencies of state administration in the USSR, within the confines of their competency, either jointly or in coordination with special agencies of administration of science, regulate individual important aspects of the development of science and the activities of the scientific institutions and organizations.

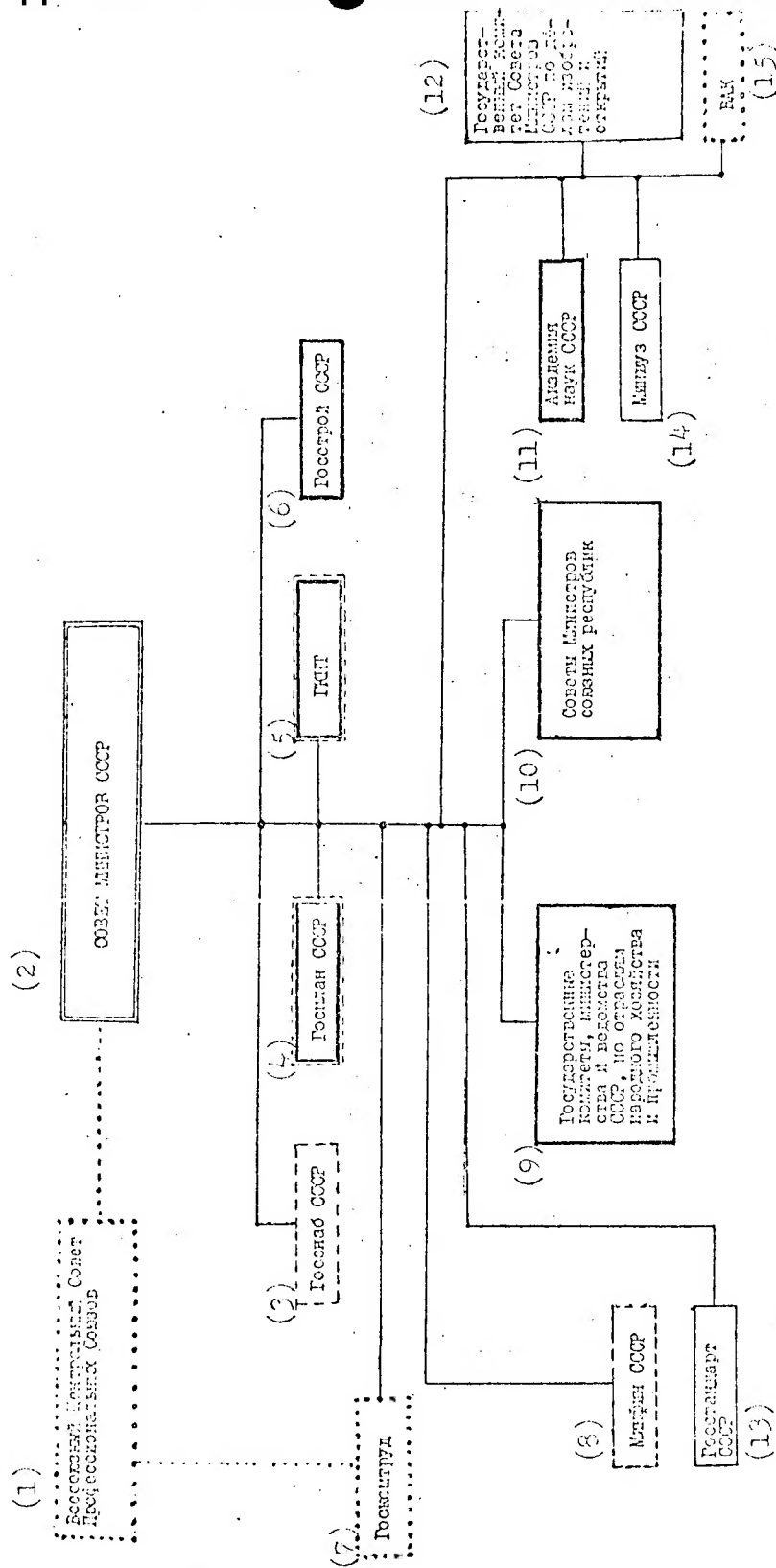
Gosplan USSR gives assignments for the development of forecasts of the development of the national economy; plans the introduction of scientific-technical achievements; participates in the development of plans for the training of personnel; considers proposals concerning the overall volumes of capital investments for the development of science; etc.; jointly with the Ministry of Finance USSR, determines the volumes of financing of scientific projects and, together with Gosstat USSR, considers proposals concerning the material-technical support of scientific institutions.

With the State Committee on Labor and Wages, Council of Ministers USSR, and the All-Union Central Council of Trade Unions, questions of the payment and conditions of the labor performed by scientific workers are coordinated.

All the previously mentioned agencies of administration -- both the special scientific ones, and the general-economic interbranch ones -- with respect to the questions that are included in their competency, issue decrees, orders, instruction guides, instructions, and explanations which are mandatory for all ministries, departments, enterprises, and organizations.

The highest scientific institution in the USSR, which unites as its members the most prominent scientists in the country -- the Academy of Sciences USSR -- is directly subordinate to the Council of Ministers USSR. In addition to the guidance of its scientific institutions, the Academy of Sciences USSR is a country-wide center for the development of scientific policy in the field of the natural and social sciences. It carries out the overall scientific guidance of research projects on the most important problems of these sciences, which are carried out in all scientific-research institutions and institutions of higher learning; defines the basic trends to be taken in research projects; plans and coordinates them. Operating as entities attached to the Presidium and departments of the Academy are scientific councils on the most important problems and trends in the natural and social sciences.





Agencies of state administration in the USSR which are responsible for the formation, implementation, and support of the country's scientific policy

[For key, see next page]

Key: 1. All-Union Central Council of Trade Unions

2. Council of Ministers USSR
3. Gosstat USSR
4. Gosplan USSR
5. GKNT
6. Gosstroy USSR
7. State Committee on Labor and Wages
8. Ministry of Finance USSR
9. State committees, ministries, and departments of the USSR, by branches of the national economy and industry
10. Councils of Ministers of the union republics
11. Academy of Sciences USSR
12. State Committee on Inventions and Discoveries, Council of Ministers USSR
13. State Committee on Standards, Council of Ministers USSR
14. Ministry of Higher and Secondary Special Education USSR
15. Higher Attestation Commission, attached to Council of Ministers USSR

----- Agencies of state administration which are responsible for the formation and implementation of scientific policy

- - - - - Agencies of state administration which participate in the determination of the volumes of financial and material-technical resources for the carrying out of scientific-research experimental-design projects and the allocation of those resources

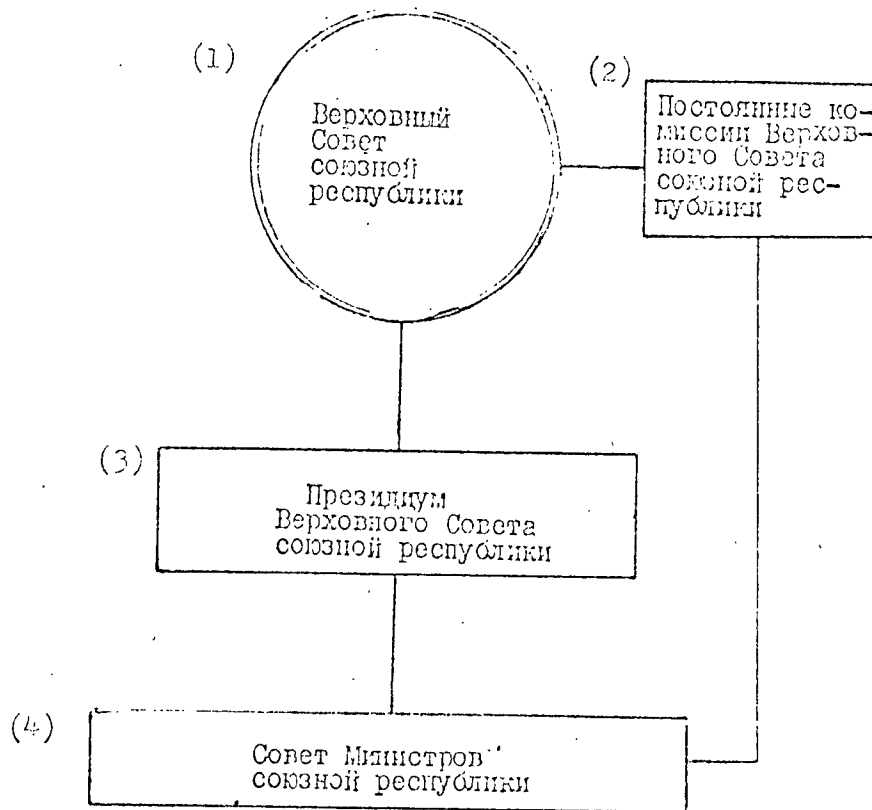
----- Agencies of state administration that influence the formation of scientific policy in the country

..... Agencies of state administration and social organizations whose decisions, directly or indirectly, influence the conditions of payment and work for employees in scientific-research institutions

The Presidium of the Academy of Sciences USSR, jointly with the Councils of Ministers of the union republics, coordinates the scientific activities of the republic-level academies of sciences. Operating as an entity attached to the Presidium of the Academy of Sciences USSR is the Council for the Coordination of the Work Performed by the Academies of Sciences of the Union republics.

The union-republic Ministry of Higher and Secondary Special Education USSR plays the main role in the guidance of the training and educational development of scientific personnel. The Ministry of Higher and Secondary Special Education USSR, as a rule, through the appropriate departments of the union republics or directly, administers the majority of the higher educational institutions in the country and the scientific work being performed in them, except for those institutions of higher learning

whose area of specialization makes it possible to include them under the jurisdiction of branch ministries (such institutions of higher learning as medical, agricultural, pedagogical, transportation, military, artistic, cultural, and certain others).



Agencies of higher state authority of a union republic which carry out activities in the field of scientific policy

- Key:
1. Supreme Soviet of the union republic
  2. Permanent commissions of the Supreme Soviet of the union republic
  3. Presidium of the Supreme Soviet of the union republic
  4. Council of Ministers of the union republic

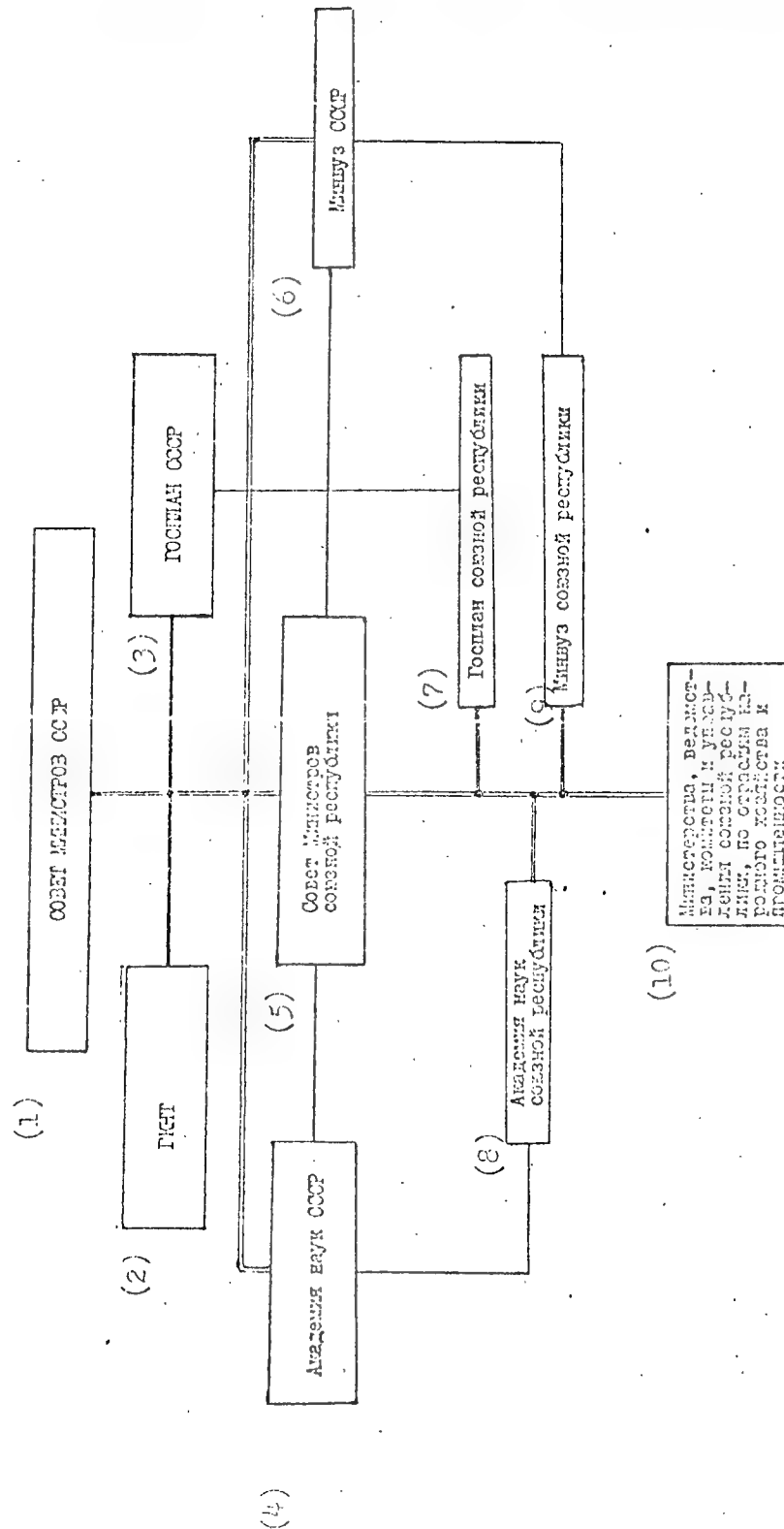
The state agencies of the union republics carry out the guidance of the development of science and technology in the republics.

By approving the republic-level plans for the development of the national economy and the state budgets, the Supreme Soviets of the union republics thus define the plans and expenses for scientific research projects which are part of the general republic-level plans and budgets.

The Councils of Ministers of the union republics have competency in a broad number of questions pertaining to the guidance of science and the technical progress which pertain to the institutions and enterprises that are subordinate to them. They unite the activities and determine the competency of the agencies of administration of the union republics to which the scientific institutions are directly subordinate; handle questions pertaining the planning of scientific-research projects and the introduction of the achievements of science and technology into the national economy; allocate funds for the financing of scientific institutions; establish the procedure of organization and open new scientific institutions and institutions of higher learning; and resolve other questions. In established instances the Councils of Ministers of the union republics, in matters pertaining to the guidance of the development of science, coordinate their actions with agencies of state administration of the USSR. The Councils of Ministers of the union republics are given the right to consider draft plans developed by the union-wide ministries for their subordinate enterprises that are located on the territory of the republic, and, consequently, the plans for scientific-research, planning-and-designing projects, and plans for new technology which are a part of the overall plans for the work to be performed by those enterprises, as well as assignments for the planning and remodeling of enterprises on the territory of the republic, and to submit their proposals concerning them to the Council of Ministers USSR and Gosplan-USA.

Important functions of guiding science are carried out by the Gosplans of the union republics; they develop long-range and yearly plans for scientific-research projects and the introduction of the achievements of science and technology into the national economy; and, jointly with the ministries and departments of finance, draw up plans for the financing of scientific projects and capital investments in science.

In order to understand the powers exercised by the branch ministries and departments of the union republics in the guidance of science, it is necessary to keep in mind the fact that, being union-republic agencies, they have a dual subordination -- to the appropriate ministry of the USSR and the Council of Ministers of the union republic. Within their direct jurisdiction are the majority of the enterprises, institutions, and institutions of higher learning that are included in the systems of the union-republic ministries. Correspondingly, they resolve all questions pertaining to the guidance of the subordinate institutions either independently, or with coordination with a union ministry.



Agencies of state administration of a union republic which are responsible for the formation and implementation of scientific policy in a union republic, and their interrelations with the appropriate agencies of state administration of the USSR

For key, see next page]

2. GKNT
3. Gosplan USSR
4. Academy of Sciences USSR
5. Council of Ministers of union republic
6. Ministry of Higher and Secondary Special Education USSR
7. Gosplan of union republic
8. Academy of Sciences of union republic
9. Ministry of Higher and Secondary Special Education of union republic
10. Ministries, departments, committees, and administrations of union republic, by branches of the national economy and industry

----- Links between agencies of state administration of union and republic importance

----- Links between union, union-republic agencies of administration and the Academy of Sciences USSR, and an agency of state administration in a union republic.

[Question] 1.1.2. By whom and on what basis is the decision on annual volume of money, manpower, and materials for R&D made?

[Question as retranslated from Russian] By whom and on what basis are decisions made concerning the extent of assets, personnel, and materials to be expended for the carrying out of NIIOKR [scientific-research experimental-design projects]?

[Answer] The experience that our country has had indicates that such functions as the determination of the overall extent of national appropriations for scientific research, the planning of current and long-range capital investments in science, can be successfully carried out only on the state-wide level. Taking into consideration what has been said, it was deemed to be desirable for the plan for the financing of scientific-research projects to be included in the State Plan for the Development of the National Economy of the USSR as a separate part of the plan.

The State Plan for the Development of the National Economy of the USSR stipulates the overall sum of expenditures for scientific-research projects and the overall wage fund for workers in scientific-research institutions, that is, indices which also determine the extent of the assets, personnel, and materials to be allocated for the carrying out of scientific-research projects.

The plan also defines the volumes of capital investments to be allocated for the construction of scientific entities.

Thus, the final decision concerning the extent of the assets, personnel, and materials for the carrying out of scientific research as a whole for the country is made by the Government of the USSR, with the approval of the State Plan for the Development of the National Economy of the USSR, on the basis of proposals prepared by the GKNT, Gosplan USSR, the Academy of Sciences USSR, jointly with the Ministry of Finance USSR.

[Questions as retranslated from Russian] Questions pertaining to key problems.  
How are these problems selected?

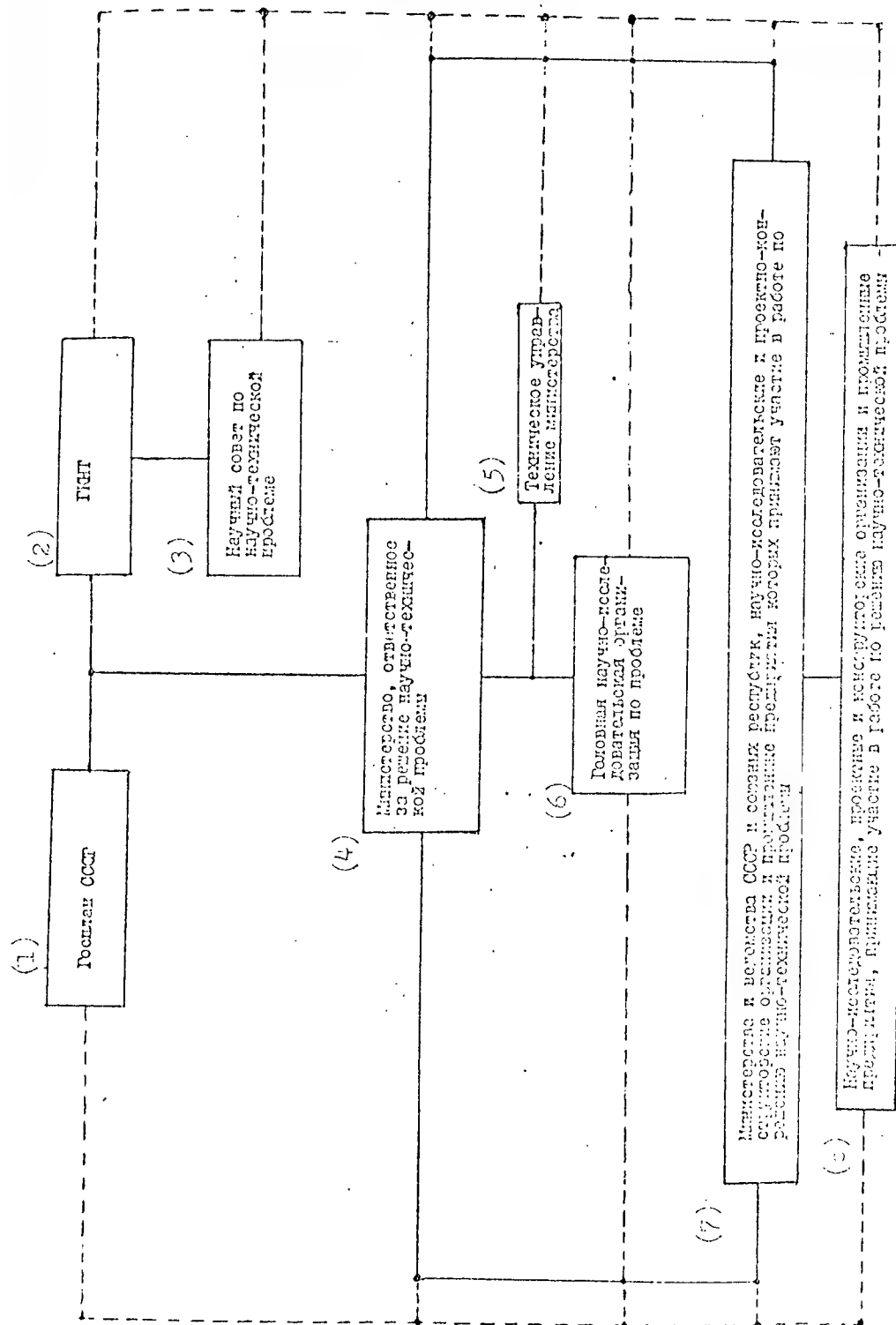
[Answer] The list of basic scientific-technical problems that are to be included in the five-year national-economic plan, as well as the ministries and departments responsible for the solution of each problem, are determined at the stage of formation of the basic trends in the development of science and technology for the five-year period by the GKNT, jointly with Gosplan USSR and the Academy of Sciences USSR. This list includes the most important scientific-technical problems which, as a rule, are of interbranch importance.

A scientific-technical problem is a complex of interrelated tasks, the fulfillment of which tasks plays an important role in the acceleration of technical progress in the entire national economy. The chief content of the plan for the solution of the basic scientific-technical problems is:

the creation and [production] assimilation of new highly-productive machinery and equipment for the complete equipping of industrial production, construction, agriculture, transport, and the communal economy, as well as the creation and [production] assimilation of effective technical means for the mechanization and automation of production processes; the creation and assimilation of new, more economical materials;

the creation and assimilation of highly-effective technological processes that assure the complete use of raw and other materials; the improvement of the quality of output, of labor and material material expenditures; the increasing of productivity; the improvement of working conditions;

the further improvement of the methods of organization of production, the administration of production and the scientific organization of labor; the creation and assimilation of automated control and information-processing systems, automated systems for the control of technological processes, the solution of problems in the field of construction, architecture, agriculture, public health. These problems include, for example, the development of effective methods and means for the prevention, diagnostics, and therapy of the basic disorders of the cardiovascular system; the development of the scientific principles and measures for the complete use of the country's water resources and their protection against pollution; the protection of the soil against erosion; the further development of the scientific principles of plant nutrition and the increasing of soil fertility; the development of measures for the development of the centralized heat supply for cities and industrial enterprises; research on the World Ocean; etc.



Flow chart showing the organization of work involved in the solution of a scientific-technical problem.

[For key, see next page]



2. GKI
3. Scientific Council for the scientific-technical problem
4. Ministry responsible for the solution of the scientific-technical problem.
5. Technical administration of the Ministry
6. Head scientific-research organization for the problem.
7. Ministries and departments of the USSR and the union republics, scientific-research and planning-and-designing organizations and industrial enterprises which participate in the work of resolving the scientific-technical problem
8. Scientific-research, planning, and designing organizations and industrial enterprises which participate in the work of resolving the scientific-technical problem

#### Administrative links

The basic criteria for the selection of problems for inclusion into the draft version of the State Plan for the Development of the National Economy of the USSR are their interbranch importance; the social importance and technical-economic benefit to be derived from the solution of the problem that has been set down (the calculated expenditures, etc.).

When formulating the list of scientific-technical problems, aid is elicited from Scientific Councils, scientific-technical commissions, major scientists and specialists, and individual organizations.

[Question] 1.1.3b. How often is the list revised?

[Question as retranslated from Russian] How often is the list of problems reviewed?

[Answer] The list of problems is prepared together with the draft versions of the five-year plans, but, as the operations are fulfilled and new long-range trends for the development of technology appear, it can be amended.

[Question] 1.1.3c. Does it include military projects?

[Question as retranslated from Russian] Does it include military projects?

[Answer] Military projects are not included in the list of problems.

[Question] 1.1.3d. What is the role of the Ministry to which the "head institution" carrying out the project belongs?

[Question as retranslated from Russian] What is the role of the ministry to which the "head organization" carrying out the project is subordinate?

[Answer] The ministry (department) responsible for the solution of the scientific-technical problem assures the formation of the draft version of the plan for the problem; the complete and timely fulfillment of the assignments; their financial and material support; and also the acceptance of the completed work from the executors.

During the development of coordination plans for major interbranch problems, the lead ministries, as a rule, the consumer of the results of the solution of the problem, having evaluated the volume and nature of the operations, develop the preliminary considerations on the assignments for the possible executors and the deadlines for their fulfillment. These considerations are sent to the appropriate ministries and departments, which, directly with the scientific organizations, consider the possibility of the fulfillment of the assignments within the proposed deadlines. Naturally, on the part of the executors there might arise counterproposals concerning the deadlines for the fulfillment of the financing and concerning the technical parameters. For purposes of coordinating all the questions in the plans for the resolution of problems, the lead ministries organize bilateral and multilateral consideration of the draft version, clarify all the unclear questions, and carry out the coordination of the plan and its indices.

[Question] 1.1.4a. How is scientific advice mobilized and organized in the U.S.S.R.? What role does "independent nondepartmental expertise" play in evaluating new technological products and processes, in monitoring R&D programs, etc.?

[Question as retranslated from Russian] How is scientific advice put into action and organized in the USSR? What role does "independent nondepartmental expertise" play in evaluating new technology and technological processes, in administering scientific-technical programs, etc.?

[Answer] All agencies of administration of scientific-research and experimental-design projects carry out their work by relying on a well-developed system of scientific consultative and deliberative agencies, the makeup of which includes major scientists and leading specialists in the particular area of science and technology.

By way of an example one might indicate the learned councils of the scientific institutions and the institutions of higher learning; the scientific-technology councils of ministries and departments; the scientific councils on individual problems which exist in the Academy of Sciences USSR and the GKNT; etc.

The question of the providing of expertise on various aspects of scientific-technical progress can be resolved the USSR Government, the GKNT, Gosplan USSR, Gosstroy USSR, and the Academy of Science USSR, for which the appropriate commissions and expert groups exist or are created.

Their chief role consists in determining the trends to be followed by the scientific research, and the most effective paths for the resolving of problems. They view the reports submitted by the directors of the scientific-research and design organizations, enterprises, institutions of higher learning, and the directors of individual projects concerning the status and the future prospects for the projects and the possibilities of the practical use of the obtained results; provide an evaluation of the results of those projects; and submit, for the consideration of the Committee,

recommendations that have been directed toward the development of the projects being considered, and, if necessary, the proposals concerning the cessation of unpromising scientific-research projects.

[Question] 1.1.4b. Describe the place of technological forecasting in research and development planning.

[Question as retranslated from Russian] Describe the role of scientific-technical forecasting in the planning of scientific research and development.

[Answer] At the present time, a large amount of attention is devoted to the development of forecasting in the field of science and technology. Our scientists and specialists have developed forecasts for a prolonged period of time for the development of the most important trends in science and technology. Long-range developments make it possible to determine more correctly the general trends to be taken in the development of technology and production, and to achieve the more efficient use of resources. Forecasts for the most important trends in the development of science and technology are considered at sessions of the GKNT and the Presidium of the Academy of Sciences USSR, and are then sent out to all the interested organizations, which use these forecasts as working materials when preparing the five-year and long-range plans for the development of the national economy of the USSR. Among the considered forecasts on problems, one might name, for example, the fuel-and-power balance sheet for the country for the long-range period; the complete development of transportation; the efficient structure of steel production; and certain others.

[Question] 1.2.1. Has the U.S.S.R. developed an analytic treatment of the R&D process? If so, what input measures and what output measures are used?

[No page with question translated into Russian, and answer in Russian. Page presumably omitted.]

[Question] 1.2.2. How does the U.S.S.R. determine the quality of its R&D?

[Question as retranslated from Russian] How is the quality of scientific research and development determined in the USSR?

[Answer] The quality of scientific research and development is determined by their innovation and their long-range promises, patent protectability, and social recognition, as well as the economic effectiveness of the use in the national economy of the results obtained when carrying out the considered research and development.

Consideration is also made of the social and economic consequences of the practical use of the results of these projects.

The evaluation of the quality of the scientific-research experimental-design projects is carried out by the scientific consultative agencies (the learned and scientific-technical councils of scientific institutions and departments, scientific-technical and expert commissions, etc., the composition of which, as a rule, includes major scientists in the particular field of science, leading specialists, and directors of the branch).

The usual procedure for evaluating the quality of scientific-research experimental-design projects lies in having the scientific director of the project being considered prepare a report, which is sent to experts called in to discuss the particular projects, who prepare their findings based on the materials submitted; the members of the consultative agency and the experts acquaint themselves with the project at the place where it is being conducted, and discuss it with the executors and representatives of the interested branches of industry and with the scientists working in the particular field of science and technology.

Then the report and the experts' findings are considered at a session of the consultative agency, which, as a result of the complete discussion, makes a decision that contains the evaluation of the project being considered.

The decision issued by the consultative agency notes the results obtained in the course of the fulfillment of the project (successes and shortcomings) and provides recommendations for the development or discontinuation of the projects.

The decision issued by the consultative agency is approved by the leadership of the organization under which it was created.

As a rule, the initial evaluation of a project is given by the Learned Council of that scientific institution in which the project is being fulfilled, and, depending upon its importance, that project can become the object of consideration by scientific consultative and deliberative agencies at various levels of administration (for example, the scientific-technical council of a ministry; the Presidium of the Academy of Sciences USSR; the Scientific Council of the Problem, attached to GKNT; etc.).

[Question] 1.2.3. What measures are used for determining technological advance?

[Question as retranslated from Russian] What gauges are used for determining scientific-technical progress?

[Answer] The basic index of scientific-technical progress is the increase in the effectiveness of social production, as well as such indices as:

- volumes of introduction of fundamentally new tools of labor, materials, and technological process, which have technical-economic indices surpassing the best domestic and worldwide achievements;

- volumes of increase in the production of output of improved quality in all branches of the national economy;

- rates of rise in the technical level of the technological-equipment pool, the acceleration of the replacement and modernization of obsolete machinery and assemblies;

reduction in the amount of materials required for production, improvement in the design of machinery, application of progressive technology, complete use of raw and other materials;

level of electrification of production and the effectiveness of the use of power;

volumes of introduction of machinery systems for the complete mechanization and automation of the most important production processes in industry, construction, agriculture, and transport;

rates of renovation of existing and introduction of progressive standards and specifications for the providing of a high technological level and quality of output;

scope of introduction of the scientific organization of labor, production, and administration with the use of modern means of organizational and computer technology.

[Question] 1.2.4. How does the U.S.S.R. estimate the economic, environmental, social and political side effects of new technology.

[Question as retranslated from Russian] How are the side effects upon economic, political, and social activities and upon the environment evaluated in the USSR?

[Answer] It is necessary to note that the State Plan for the Development of the National Economy of the USSR is a plan for the solution of socio-economic problems for the planned period, and therefore new technology in our country is not only a means of increasing the effectiveness of socialist production, but also a means of resolving social tasks (raising the material and cultural standard of living for the entire Soviet nation; reduction of the number of workers employed in harmful conditions; elimination of occupations linked with heavy physical labor; etc.).

During the preparation of the draft versions of long-range and yearly plans for the development of the national economy of the USSR, at all stages of their compilation and consideration, extremely careful attention is devoted to the analysis of the the possible social and ecological consequences of the introduction of new technology.

When discussing scientific-technical problems at the scientific councils attached to the GKNT, special attention is devoted to these questions. If necessary, additional expertise is called upon to obtain an evaluation of the side effects of the new technology upon the environment.

[Question] 1.3.1. What are the mechanisms by which success is judged and unsuccessful programs terminated? Who decides whether or not a program has become obsolete?

[Question as retranslated from Russian] With the aid of what mechanisms is the success of programs determined, or are programs that are not yielding the proper results terminated? Who decides whether a program is obsolete?

[Answer] As was already indicated, there are operating, attached to the GKNT, scientific councils on the most important interbranch problems of science and technology, scientific-technical commissions, and expert groups. The scientific councils analyze the status of the research projects on the problem and determines the paths for the further work; develop plans for research projects, assignments for the institutions participating in the project; coordinate their work; consider the course and results of the research; organize information concerning the research projects; and make recommendations on the material-technical supply and financing of the projects and other questions. For the consideration of individual aspects of the problem, permanent or temporary sections and commissions are created as part of the makeup of the councils. On the basis of the results of the consideration and the recommendations provided by the scientific councils and the scientific-technical commissions, the GKNT makes decisions concerning the development or termination of the projects that were planned.

In the event that the decision to carry out the indicated research program was made by the Government, the recommendations for its termination are submitted for the consideration of the Government, and, if the decisions concerning the carrying out of the project were made by an institute, association, or ministry, the recommendations for the termination of these projects are sent to the directors of the indicated organizations.

[Question] 1.3.2. Who decides whether or not a scientific research institute or design bureau should be closed down or reorganized along new lines? What are the criteria used in reaching these decisions?

[Question as retranslated from Russian] Who decides whether it is necessary to close a scientific-research institute or design bureau, or to reorganize it in conformity with a new policy course? What criteria are used as a guide in the making of these decisions?

[Answer] The elimination and reorganization of scientific-research institutions and design organizations are carried out on the decision of those agencies which are empowered to form the corresponding organizations.

Questions of the elimination of scientific-research institutions are resolved by the ministries and departments of the USSR, as well as the Councils of Ministers of the union republics, with the coordination of the GKNT.

Such decisions are made in the event of the nonfulfillment, by the indicated institutes and organizations, of the tasks entrusted to them, or if, upon the fulfillment of their functions, such organizations are no longer needed.

If there is a need for the development of projects along new directions, in certain instances decisions are made concerning the change in directions to be taken in the activities of those organizations which are involved in those projects.

[Question 1.4.1. as originally phrased in English is not included.]

[Question] 1.4.1. [as retranslated from Russian] What is the essence of the methods of administration of the scientific-research programs in the USSR, that is, how is the initial evaluation of the expenditures carried out, what means are used to determine whether a concrete program is being fulfilled in conformity with the plan, how does one act in the event of exceeding of expenditures?

[Answer] The necessity of development of large-scale, comprehensive interbranch programs for the development of technology and technological processes evolves from a new approach to the use of the achievements of science, which approach obliges all the state and economic agencies, when preparing the basic indices for the development of the national economy of the USSR, to accept the advanced scientific-technical achievements as the initial determining principle. The basic task of developing large-scale interbranch scientific-technical programs is the acceleration of the realization of scientific-technical achievements through the timely, comprehensive preparation of investment programs, the coordination of the activities of many branches, sub-branches, scientific organizations and enterprises during the resolution of the tasks influenced by these programs for the guaranteeing of the coordinated efforts of all participants.

The development of the draft versions of the large-scale interbranch scientific-technical programs is organized by the GKNT.

The program draft versions that are submitted by the ministries and departments are considered by the GKNT jointly with Gosplan USSR, which stipulates in the draft versions of the long-range and current national-economic plans a complex series of assignments evolving from the previously indicated program, which are linked with their support. The execution of the assignments stipulated by the programs is entrusted to the branch ministries, departments, and union republics.

The draft versions of large-scale programs are approved by the Government.

One might cite as examples of such programs, for example, the development and construction of large-capacity power facilities; the creation of extra-long lines for the transmission of electric power at extra-high tension; the development and implementation of machinery systems for the complete mechanization of agricultural production; etc.

The implementation of a scientific-technical program is linked with the fulfillment of an entire complex of scientific-research, planning-and-designing, experimental, experimental-industrial projects and tests that are necessary to bring the developments to the stage of industrial use.

A computation of the necessary resources (personnel, fixed assets, materials, instruments) for the solution of the tasks in the program is prepared by the lead ministries or departments, with the participation of the co-executors. The final decision concerning the amount of the resources to be allocated is made during the approval of the program. Simultaneously provision is made for the necessary indications to the appropriate agencies of administration (Gosplan USSR, GKNT, the ministries and departments of the USSR, the union republics) to stipulate, in the plan, the necessary resources.

The largest-scale scientific-technical programs undergo expert evaluation at the State Expert Commission of Gosplan USSR. For individual programs, the GKNT organizes the expert evaluation. In addition to the interbranch and social importance, a criterion for the effectiveness is the national-economic benefit, which is determined first by the moment of approval of the program, and subsequently at the stage of completion of the planning-and-designing operations.

The indices of economic effectiveness include:

1. Specific capital investments (ratio of capital investments to increase in production that is caused by these investments or the beneficial effect. The increase in the production or the beneficial effect is computed in physical terms, and, in the event of comparable output, in 1967 prices; capital investments are computed in 1969 estimate prices).
2. Labor requirements of output or beneficial effect (in average-yearly workers or man-hours) per unit of new output or beneficial effect.
3. Expenditures of raw and other materials, electric power per unit of increase of output capacity or beneficial effect.
4. Expenditures of equipment per unit of capacity or beneficial effect.
5. Complete expenditures in terms of cost.



In addition to the indices of program effectiveness, consideration is made of indices of the technical level of production to be achieved as a result of its implementation (correlation in the output of new and traditional output, scope of application of new types of equipment and technological processes, level of mechanization and automation of production).

When carrying out projects according to the program, consideration is made every year of the expenditures for its implementation. Since the financing of scientific-research projects is carried out in conformity with annual plans, there is always the opportunity to take into consideration, in instances when such action is desirable, the changing of the indicated expenditures.

It might turn out that the actual expenditures greatly exceed the expenditures that are set down by the draft version, and exert a substantial influence upon the expected amount of economic effectiveness, reducing its importance. In a number of instances there thus arises the question of the termination of projects in accordance with the particular program.

The termination of projects according to the program is carried out on the decision of those agencies which are authorized to sanction the carrying out of the program with a mandatory report on this question to the Government.

[Question] 1.4.2. Is responsibility for control of many programs centralized in a single office? Are funds for a program scheduled ahead for the complete program, or is the allocation of funds and materials contingent upon how well the program is progressing?

[Question as retranslated from Russian] Is responsibility for control of many programs concentrated in one institution? Are funds appropriated ahead of time for the entire program, or does the distribution of funds and materials depend on how successfully the program is progressing?

[Answer] The immediate control of the projects on the program is carried out by the appropriate head ministries and departments.

The necessary resources are allocated annually with the approval of the annual plans for the development of the national economy.

Of course, the distribution of these funds depends upon how successfully the projects set down by the program are being fulfilled.

[Question] 1.4.3. R&D organizations have projects that are financed through contacts [sic] with other organizations as well as projects financed from the state budget. How are the proportions for the two kinds of financing determined in the planning process?

[Question as retranslated from Russian] Scientific-research organizations carry out projects which are financed on the basis of contracts [sic] with other organizations, as well as projects financed from the state budget. How is it determined which part, in the process of planning, is occupied by both types of financing?

[Answer] The State Budget finances, first of all, scientific research projects to resolve the basic scientific-technical problems stipulated in the State Plan for the Development of the National Economy of the USSR, problems in the natural and social sciences, and research projects linked with the solution of the most important tasks in the development of a branch as a whole.

At the same time, the ministries and departments carry out the financing of scientific research projects through their own funds, which represent resources that are taken into consideration in the plans for enterprise cost of production, construction-and-installation operations, and other types of activity. The extent of these resources for each ministry and department are stipulated in the plan for financing of scientific-research projects as a source of financing.

The share of the own funds of ministries, departments, and enterprises in the financing of scientific research projects (not including capital expenditures for the construction of scientific objectives) expended for the financing of scientific research and development came to 29.8 percent in 1966, and in 1970 reached 35 percent.

The question of the ratio of the share of budgetary financing and own funds of ministries and departments which are allocated for the carrying out of scientific research and development is resolved each time with a consideration of the specific status of the development of the appropriate fields of science and technology.

As for the volumes of expenditures for the carrying out of scientific-research projects based on contracts, in each specific instance the scientific-research institution, ministry, and department determines which tasks entrusted to it and planned by research programs they will fulfillment by their own forces, and the solution of which tasks will require them to elicit aid from outside organizations. Determination is also made of the volumes of expenditures necessary for the fulfillment of projects which will be [fulfilled] by outside organizations on the basis of contracts.

The sources of financing to cover the expenditures for the work to be performed on contract can be either the funds allocated to the particular ministry (department, scientific institution) customer from the state budget, or its own resources.

[Question] 1.4.4. Describe the process by which budget financed projects are allocated to R&D organizations. How does the U.S.S.R. estimate the amount of technical risk in an R&D program, i.e., the probability of success or failure?

[Question as retranslated from Russian] Describe the procedure for the transfer of projects to be financed from the state budget to the scientific-research organizations. How is the degree of technical risk in the fulfillment of the scientific-research program evaluated in the USSR, that is, the probability of success or failure?

[Answer] For purposes of the most complete accounting, in the national-economic plans for the achievements of science and technology, the State Committee on Science and Technology, of the Council of Ministers USSR, and the Academy of Sciences USSR, on the basis of materials furnished by the ministries and departments of the USSR, the Councils of Ministers of the union republics, the branch academies of sciences, and the scientific-technical societies, ahead of time -- prior to the drawing up of the plans -- work out the proposals concerning the use in the national economy of the results of the completed scientific-research projects that are of great national-economic importance, as well as proposals concerning the organization of further development, in the institutes and the design bureaus of ministries and departments, of the most promising fundamental research projects that have been fulfilled by institutions of the Academy of Sciences USSR and the academies of sciences of the union republics, the branch academies of sciences, and the institutions of higher learning.

With a consideration of these proposals, the plans stipulate the specific assignments and measures for the development and assimilation into the national economy of the new technological processes, highly productive machinery and equipment, methods of organization of production and labor; for the use of new, more economical materials; and also for the complete mechanization and automation of production.

As for the determination of the degree of technical risk in the fulfillment of definite programs, that is evaluated as a result of the broad discussion of the planned program at various stages of its consideration by the appropriate scientific consultative agencies (learned and scientific councils, expert groups, etc.), the findings of which are submitted for the review of those levels of administration which have the right to make the decision concerning the carrying out of the projects on the basis of the planned program.

Section III -- The Role of Branch Ministries

[Question] 2.1. To what extent are the ministries free to determine their own R&D programs? What is the role of the ministries in planning the introduction of new technology? Who decides to put a particular product into series production or introduce a new process?

[Question as retranslated from Russian] To what degree can the ministries determine their own scientific-research programs? What is the role of the ministries in planning the introduction of new technology? Who decides whether to retool to mass production of a definite type of product or whether to introduce a new process?

[Answer] A USSR ministry is a central agency of state administration that carries out the direction of the corresponding branch of the national economy.

A USSR ministry is responsible to the state for the condition and the further development of the branch, the scientific-technical level, and the technical level of production, the quality of the output being produced, and the most complete satisfying of the country's needs for all types of output produced by the branch.

One of the chief tasks of the USSR ministries is: the carrying out of a uniform technical policy in the branch; the introduction of the latest achievements of science and technology and advanced experience; and the guaranteeing of high technical-economic indices of production.

In conformity with the Constitution of the USSR, a USSR ministry may be an all-union or a union-republic ministry, and it is formed by the Supreme Soviet of the USSR.

An all-union ministry directs the branch entrusted to it on the entire territory of the USSR, directly or through agencies created by it.

A union-republic ministry of the USSR directs the branch entrusted to it, as a rule, through similarly-named ministries of the union republic, and administers the enterprises, organizations, and institutions of union subordination, directly or through agencies created by it.

The USSR ministry, the similarly-named ministries of the union republics, and their subordinate enterprises, organizations, and institutions constitute the single system of the appropriate ministry.

In the field of science and technology, a USSR ministry:

carries out systematic work to evaluate the achieved technical-economic level of production and the branch output being produced; determines the paths for the most effective use of the scientific and technical achievements; and assures the high technical level of the development of the branch on the basis of the achievements of domestic and foreign science and technology;

assures the development of scientific-technical problems in the branch, from a scientific search to the introduction of the achieved results into production; and also carries out work linked with the solution of comprehensive interbranch scientific-technical questions;

directs the activities of the scientific-research institutions and planning-and-design organizations in the ministry system, and carries out measures to improve the planning and organization of scientific-research and experimental-design work and to increase their effectiveness;

provides the scientific-research institutions and planning-and-design organizations with the necessary experimental-production base, which conforms to the modern technical level;

assures the development and introduction into production of new types of output which conform to the modern achievements of science and technology and to the demands of the national economy, as well as the development and introduction of highly-effective technological processes and methods of organizing production; carries out measures for the complete mechanization and automation of production, and the use of more economical raw and other materials;

resolves, with the coordination of the appropriate ministries and departments of the USSR, questions involving the removal of obsolete output from production;

studies the experience of operating and use of output being produced, develops and takes steps to eliminate any design or production shortcomings that might be found in the output, and to increase the reliability and service life of the articles;

develops and submits for approval the draft versions of state standards; assures the introduction of state standards and modern means and methods of measurements and tests of output quality, as well as supervision over the observance of standards and the status of means of measurement and tests;

approves, for individual types of output for which there are no state standards, branch-wide technical-norm documentation;

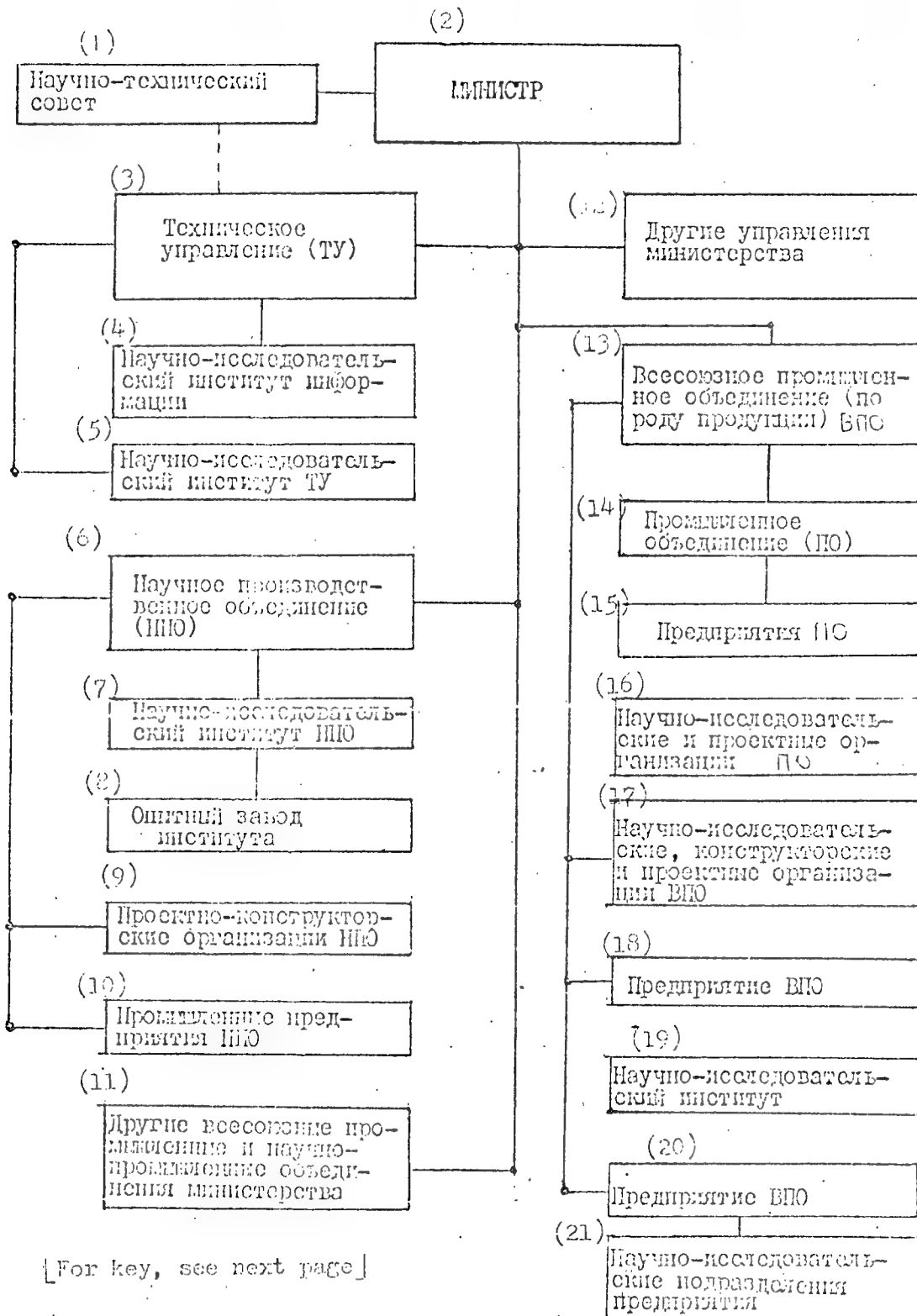
organizes scientific and scientific-technical information, assures the preparation and publication, in the established procedure, of scientific and scientific-technical literature for the branch.

The ministries and departments, in close contact with the State Committee on Inventions and Discoveries, Council of Ministers USSR, carries out guidance of the development of inventions and improvement suggestions at their subordinate enterprises, in the organizations and institutions, and supervises their activities in this area; organize the

timely use of inventions and improve-suggestion proposals, and supervises their use; prepare proposals concerning the patenting of inventions abroad, and concerning the buying and selling of licenses; supervise the fulfillment of the pledges in accordance with license agreements that pertain to the ministry or department system;

develops and submits, in the established procedure, proposals concerning the purchase of licenses abroad for the technically and economically most progressive machinery, equipment, materials, and technological processes; assures the most rapid assimilation of the production of output on the basis of purchased licenses.

scientific research and experimental design projects in a union branch ministry



[For key, see next page]

Key: 1. Scientific Council

2. Minister
3. Technical administration (TU)
4. Scientific-research institute of information
5. Scientific-research institute of TU
6. Scientific production association (NPO)
7. Scientific-research institute of NPO
8. Experimental plant of institute
9. Planning-and-designing organizations of NPO
10. Industrial enterprises of NPO
11. Other all-union industrial and scientific-industrial associations of ministry
12. Other administrations of ministry
13. All-union industrial association (for type of output) (VPO)
14. Industrial association (PO)
15. Enterprises of PO
16. Scientific-research and planning organizations of PO
17. Scientific-research, designing, and planning organizations of VPO
18. Enterprise of VPO
19. Scientific-research institute
20. Enterprise of VPO
21. Scientific-research subdivisions of enterprise



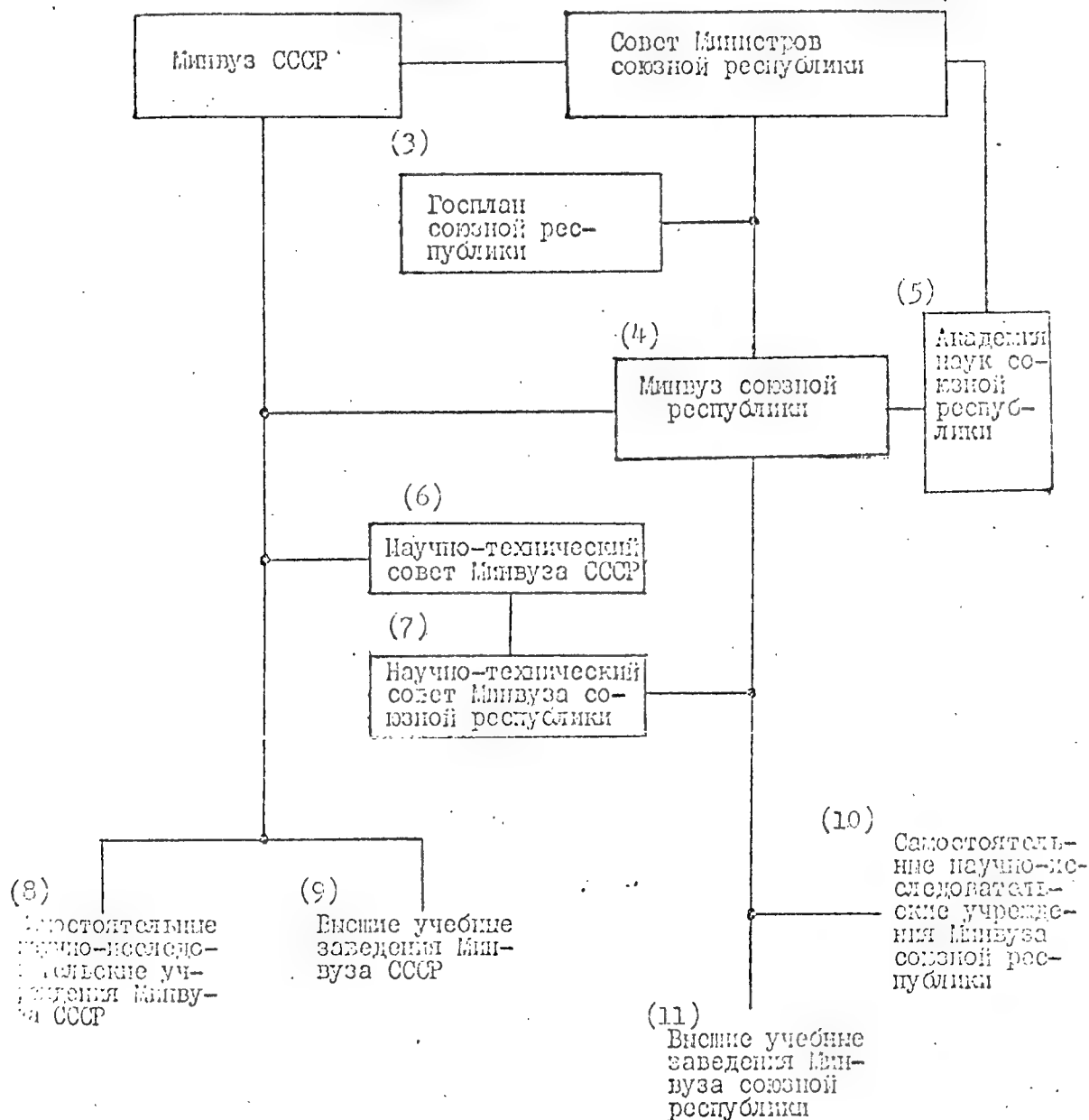


Chart showing administration of scientific institutions in a union-republic ministry, using the example of the Ministry of Higher and Secondary Special Education USSR (Minvuz USSR).

[For key, see next page.]

2. Council of Ministers of union republic
3. Gosplan of union republic
4. Minvuz of union republic
5. Academy of Sciences of union republic
6. Scientific-technical Council of Minvuz USSR
7. Scientific-technical Council of Minvuz of union republic
8. Independent scientific-research institutions of Minvuz USSR
9. Higher educational institutions of Minvuz USSR
10. Independent scientific-research institutions of Minvuz of union republic.
11. Higher educational institutions of Minvuz of union republic

[Question] 2.2. What problems have been encountered in organizing and administering scientific production association [sic]? What is being done to solve these problems? How are the R&D planning and management functions of the ministries affected by creation of scientific production association?

[Question as retranslated from Russian] What problems have been encountered in organizing and administering scientific production associations? What is being done to resolve these problems? How has the creation of scientific production associations influenced the functions of planning and administration of scientific research and development of the ministries?

[Answer] The tasks of accelerating scientific-technical progress require the changeover from extensive to intensive forms of scientific and production activity, the reduction of the time gap between fundamental and applied research, the developments and the practical use of their results. A factor of primary importance under modern conditions is the guaranteeing of the unbroken "research-production" cycle.

The scientific-technical revolution brought to life a new form of organization of these operations -- the scientific-production associations (SPA -- Russian abbreviation NPO), which carry out the complete "research-production" cycle and which were formed as a qualitatively new organization for a comprehensive, "systems" administration of the scientific-technical progress.

The scientific production association is a single complex that carries out, on the basis of the organization of the complete "research-production" cycle, the creation of fundamentally new technology, with its subsequent transmittal for mass production to branch enterprises after experimental checking, modification, and the production of the first series. The SPA fulfills the functions of the scientific-technical center of the branch (sub-branch) for the assigned area of specialization and consists of scientific-research, design, planning-and-design, technological, experimental-production, production, and other entities. The leading (head) entity of the SPA is the scientific-research institute. The necessity of development such a form of entities was specifically indicated by the 24th Congress of the CPSU. The composition of the structural subdivisions of the complex is determined on the basis of the specific tasks entrusted to the SPA, and, as a rule, reflects the specifics and peculiarities of the corresponding branches.

At the present time it is possible to differentiate, in industry, three basic types of SPA according to the type of final output:

1. Those that specialize in the creation of primarily new types of articles.
2. Those that engage in the development of means of mechanization and automation of production, and automated systems of control.
3. Those that engage in the development, planning, and assimilation of new technological processes.

An SPA is a qualitatively new form of link between science and production, all the subdivisions of which form become links in a single scientific-production process which are united to one another by the necessity of the fulfillment of the complete cycle of operations -- from research to the production of new technology.

Within the framework of the SPA, provision is made for a totality of conditions for the unity of the goals of its component subdivisions. The efforts of scientific-research, experimental-design, industrial, and other organizations in the complex are aimed at the creation and introduction into production of the corresponding product as the final result of the scientific development. The integrated producers do not form individual parts, but represent a single whole.

In the SPA the functions of coordination of the actions of the individual producer subdivisions are carried out more successfully. Provision is made for their closer collaboration, inasmuch as there are more opportunities than in other complexes for the efficient placement of forces, and the formation of appropriate specialized scientific, design-and-planning, and other organizations.

In the SPA there is a gradual merging of the scientific-research and design operations with the organizational-economic preparation of production, with the industrial manufacture and testing of articles. There is also created a single cycle for the "research-production" process, which is considerably reduced through the combination in time of individual stages, for example, the design and planning operations and the preparation of production. The organization of parallel and joint carrying out of projects makes it possible to effect stage-by-stage supervision over the course of the development. As early as the stage of scientific search there is joint work by the scientific, planning subdivisions, and the experimental production. This work of various subdivisions of the SPA is also carried out at subsequent stages.

An analysis of the complete cycle of operations for the creation of new technology indicates that in an SPA, unlike the disparate scientific-research, planning-and-designing organizations, and enterprises of experimental and series production, conditions are assured for the use of internal reserves for reducing the cycle of manufacture of new types of output through a combination of phases and the parallel fulfillment of projects.

The distinguishing characteristic of an SPA, as compared with other complexes, is the responsibility for the scientific-technical level of the branch (sub-branch) as a whole, which most completely characterizes the effectiveness of their activities. The SPA's are called upon to fulfill the role of scientific-technical centers for the branch (sub-branch) for the area of specialization assigned to them. The tasks of the SPA's, as the head organizations in the branch (sub-branch), include: the development of the most important trends in research for the long term; the development of new designs and technology which assure the creation of the necessary scientific backlog for the continuous raising of the technical level in the corresponding area of production.

The most important functions of the SPA's are the development of branch services, in particular, the scientific-technical information service; the carrying out of patent and license work, of technical-economic justifications, the scientific organization of labor, the training of personnel, the establishment of norms, standardization and unification; forecasting and the study of demand for the output to be produced; the development of material and labor norms; the installation and fitting of new technology; etc. Centers for the scientific servicing of enterprises and organizations in the branch are created in the SPA's; these centers include those specializing in the fulfillment of computational, patent, informational, norm-research, and other projects.

A number of economists feel that it is not mandatory to include series production within the makeup of the SPA. This correction means that any complex scientific-research institute can be included among scientific-production associations. At the same time it is necessary to emphasize that it is precisely the existence, in the structure of the SPA, of production for the output of the first series which chiefly differentiates it from a complex institute.

A number of scientific workers feel that the successful functioning of an SPA is possible only with an approximately equal ratio of the volumes of scientific-research projects and industrial output (on the basis of labor requirement).

The condition advanced is insufficiently substantiated. This ratio can differ substantially as a result of the specifics and peculiarities both of the types of SPA's, and of the branches that they represent. A factor that is of no small importance for a correct evaluation of this ratio is the consideration of the ties that the complex has with the academic scientific institutions that are carrying out the fundamental research. Obviously, it is undesirable to establish a firm percentage for the ratio of the types of activity as a mandatory condition for the functioning of an SPA. At the same time it should be noted that the existence, at the head of the complex, of low-power scientific-research institutes that have an insignificant volume of scientific-research projects (up to 10-12 percent) prevents them from successfully directing the "research-production" cycle.

The effectiveness of the activities of SPA's would be higher if there were no shortcomings in their organization. In certain of them, the conditions have not been created for the guaranteeing of uniform economic and scientific management, and, this, as a rule, leads to the fractionation of the activities of the scientific and production subdivisions. In a number of SPA's the enterprises of series production fulfill more than half the work volume on the basis of assignments that do not have anything to do with the developments produced by their own scientific-research institutes and design bureaus.

At the present time, certain SPA's are small complexes. The increase in the scientific potential, as well as the production capacities, of these associations can occur without any additional capital expenditures, through the efficient redistribution of the funds allocated to the existing scientific-research and planning-and-design organizations, as well as the purposeful use of deductions for sold output produced by the industrial enterprises of the SPA's. In a number of instances it is economically desirable to include, within the makeup of the SPA, enterprises and organizations of other branches, irrespective of their departmental subordination or territorial placement.

The experience of the activity of the SPA's attests to the fact that it is necessary to carry out separate planning of the indices for series production and for experimental production. Another factor that worsens accounting and planning is the organizational division of those production entities, the providing to each of them a definite amount of economic-operational independence and rights under conditions of internal cost accounting [vnutrikhozyaystvennyy raschet].

It should be noted that the creation of scientific-production associations did not change the functions of ministries and departments in the field of the planning and administration of scientific research and development, but made it possible to make considerably easier the work of the ministries in carrying out a uniform branch technical policy, in the preparation of plans for scientific-research and experimental-design operations, that is, in conformity with the specialization of the branch, these plans prepare the corresponding scientific-production association.

As a result, the Ministry received the opportunity to better analyze and supervise the plans for scientific-research and experimental-design projects.

[Question] 2.3. What has been the Soviet experience in regard to the success of Design Bureaus? Is there a significant disadvantage in carrying out the design independent of the manufacturing organization? Where are the decisions made on what industrial prototype designs are to be initiated? What voice does the Design Bureau have in such a decision? How are the design and construction of industrial prototypes financed -- by the central government, by enterprises, or in combination? What is the process by which a project is supposed to move from a research

institute to a design bureau to experimental production and finally into mass production? What is the ministry's role? What steps are being taken to shorten the innovation-diffusion cycle? What is the nature and extent of R&D prototype design competitions between different factories? How is a decision made on whether to select one prototype or whether to have a competition between two or more competitors?

[Question as retranslated from Russian] What has been the experience of the Soviet side with respect to the success of the activities of design bureaus. Is a considerable detriment caused in the quality of design projects if they are fulfilled independently of the production organizations? Where are the decisions made concerning the planning of which industrial models should be begun? What voice do the design bureaus have in the making of such decisions? How are the planning and designing of industrial models financed -- by central institutions, by the enterprises, or jointly? What is the procedure for the transmittal of a project from a scientific-research institution to a design bureau, to experimental production, and, finally, to mass production? What is the ministry's role? What steps are taken to reduce the invention-introduction cycle. What is the degree of competition in the field of the planning of scientific-research prototypes among various plants? What is the basis of this competition? How are decisions made as to whether to select one prototype or to create a competition between two or more competitors?

[Answer] Let us consider this practice by using as an example the Leningrad Optical Instruments Association (LOMO).

The creation of a major TsKB (Central Design Bureau) at LOMO provided the opportunity to resolve as a complex the very complicated problems and tasks of developing optical instrument-building that are created at the series assembly shops. These sectors are manned with the most qualified workers who, for a long period of time, have worked in the corresponding field of technology and who know its peculiarities. The sectors are subordinate to the management of the series shops.

The participants in the work of creating experimental models, in the working out of the technology of their manufacture, and in the tests include the shop's technical personnel.

When an experimental model has been created, tested, and accepted for production, the assimilation of the series manufacture of the new article does not cause any special difficulties in the shop. The operations of creating the experimental models, of assimilating and producing the new article, are included in the series shop's plan on a level with the basic nomenclature, and the nonfulfillment of these operations results in the nonfulfillment of the plan, with all the resultant consequences for the workers both in the series shop, and in the Central Design Bureau.

The cost of development and the scope of the possible production and application of the output determine the level at which the decision is made to develop various industrial models.

These decisions can be made by the enterprise, the association, the main administration of the ministry, the ministry, and, in especially important instances, by the Government.

At all levels of administration, the consideration of the proposals for development [presumable omission] the representatives of the design bureau necessarily taken part in the discussion of this question.

Questions of the financing of the development of industrial models are resolved together with the plan and, as a rule, are carried out at the expense of the ministry, association, enterprise, or customer.

It would hardly be possible to give an overall description of the procedure for transmitting a project from an institute to a design bureau. This, basically, is determined by the nature of the project, the level of work at the institute, and the terms of the contract.

There are no special procedures either for the manufacture of experimental models in experimental production.

However, in the annual and five-year plans for the state development of the national economy, as well as in the plans of the ministries and departments, stipulation is made for the final stages in the creation and preparation of new types of articles, materials, and technological processes for industrial use (the carrying out of tests of experimental-industrial, prototype articles, or technological processes, with the issuance of recommendations for transfer to production; the development of technical documentation for series production); as well as the stage for the production assimilation of the new model (technological process).

The question of the release for mass production is decided on the basis of the results of tests conducted on the experimental models by the ministry.

Ministry's role is discussed in answer 2.1.

The reduction of the invention-introduction cycle is one of the methods of accelerating the scientific-technical progress and a large amount of attention is devoted to these questions at various levels of administration.

For purposes of assuring the broad competition in the field of scientific-technical development, the search for new methods in the decision of scientific and technical problems and the implementation of their results, the ministries and departments of the USSR and the Councils of Ministers of

the union republics have the right, in necessary instances, to entrust the carrying out of exploratory scientific-research work, as well as planning, designing, and technological development, to several organizations so that it will be possible to select the best scientific, technical, and economic decisions.

[Question] 2.4. What steps are currently being taken to solve problems in applied R&D such as:

- a. The resistance of enterprise managers to new technology
- b. The shortage of development facilities
- c. The inefficiency in the system for producing and allocating scientific equipment

[Question as retranslated from Russian] What steps are currently being taken to resolve problems that arise during the introduction of scientific-research experimental-design projects, such as:

- a. The resistance of enterprise managers to the introduction of new technology;
- b. The limited production possibilities;
- c. The inefficiency in the system of production and placement of scientific equipment

[Answer] Under the conditions of the planned administration of the national economy, that is, when the planning indices of the work to be performed by any enterprise are considered and approved by a superior agency of administration, the posing of a question concerning "the resistance of managers to the introduction of new technology" does not have any justifications.

In individual instances there might arise situation when, during the period of assimilation of new types of output, the enterprise which is assimilating that output must expend considerably more funds than it will receive when that output is sold. These are the so-called starting-period costs, which impair the qualitative and quantitative indices characterizing the enterprise's operations. In this instance the superior agency is required to stipulate in the plan the sources to cover the enterprise's expenses to assimilate the new types of output.

The production possibilities of any industrial enterprise are always limited (production areas, equipment pool, personnel's proficiency level, material and raw-material resources, etc.). Consequently, under these conditions, one should first of all of a search for the optimal decisions and the correct ratio between the volumes of the traditionally produced output and the newly assimilated output. The search for such decisions is carried out at all levels of administration of the national economy.



[Question as retranslated from Russian] Describe the process by which new methods of planning and administration are introduced in the USSR. How are pilot units or experimental projects with the use of new methods launched, and how are they implemented along various ministerial lines and within the ministries themselves?

[Answer] The work of improving the system and methods of planning and administration which is being done in our country is aimed primarily at assuring the complete intensification of social production and the increasing of its effectiveness, including the increase in the effectiveness of scientific-technical projects and the acceleration of the introduction of scientific developments into production.

To a considerable extent the solution of these tasks is aided by the improvement of the methods of state-wide planning, as well as the improvement of methods of analyzing the technical-economic substantiations for the measures proposed for inclusion in the plan, and the consideration of the economic effectiveness to be achieved from the introduction of the completed projects; the creation of special funds for development and for the providing of material incentives, at the disposal of the scientific-research and design organizations; the increase in the role of cost accounting.

As a rule, the new methods of economic encouragement of the activity of scientific-research organizations, new forms of organizing scientific research, and of planning, are first used in one to three organizations of similar area of specialization, for the type of project to be fulfilled (development, planning, etc.). Then, as experience is accumulated, a careful study is made of the obtained result; a broad discussion of that result is organized at various levels of administration; and then the decision is made concerning the desirability of its dissemination.

As for the creation of pilot units or experimental projects with the use of cost-accounting methods, the customer organization assures the financing of all operations, from the development of the planning and technical documentation to the manufacture and construction of the experimental unit on the basis of contracts with the executor organizations, carrying out the acceptance of the completed stages of the work and paying for the cost of work accepted.

In this process the customer organization, in conformity with the contract, has the right to control not only the deadlines and the quality of the work to be fulfilled, but also controls the correctness of expenditure of the funds that it has allocated for the carrying out of the work being performed on order.

The work is done on the basis of coordinated schedules which are drawn up jointly with all the organizations and participants, and which are coordinated by all the ministries and departments participating in the fulfillment of the particular project.

Failure to meet the planned deadlines is considered by the interested organizations, and, if need be, by the corresponding ministries also.

The organization of control and the control methods may be varied, and basically are determined by the scope and volume of the projects (in these instances, wide use is made of grid schedules, stage-by-stage control, etc.).

[Question] 2.6 How are disputes over science policy issues resolved in the U.S.S.R.? Describe the nature of the mediation-reconciliation process for settling conflicts within a scientific research institute? between a scientific research institute and a design bureau or industrial enterprise subordinated to the same ministry? subordinated to different ministries? How are disputes between ministries handled?

[Question as retranslated from Russian] How are disputed questions of scientific policy resolved in the USSR? Describe the essence of the mediation and reconciliation procedure for settling conflicts in a scientific-research institute? between a scientific-research institute and a design bureau or an industrial enterprise subordinated to the same ministry? subordinated to different ministries? How are disputes between ministries resolved?

[Answer] Disputed questions of scientific policy serve as the object of broad discussion by the scientific public. At the level of the scientific-research institute, disputed questions and conflict situations are considered at sessions of scientific laboratories, sectors, and divisions. Questions that cannot be resolved there are transferred for the consideration of the director element, and, in the most serious instances, to the Learned Council of the institute. The institute's social organizations take active part in the resolution of conflicts. They can bring up the most disputed questions for discussion by a general meeting of their membership. Agencies of the Soviet press participate actively in analyzing the conflicts that are of broad public interest.

Disputes in the sphere of scientific policy between various organizations and institutions of the same branch are reconciled by the scientific-technical council of the ministry -- the branch leadership.

Differences of opinion in the field of scientific policy between ministries and departments are considered, as a rule, at the CKNT, and, in individual instances, if no solution has been achieved, at the Council of Ministers USSR.

[Question] 2.7. How and by whom is the decision made on whether to purchase foreign technology or to undertake R&D in the U.S.S.R.? What are the bases on which such a decision is made? Who has the final authority for selecting the seller of the desired technology, and on what bases is the decision made? Who decides which enterprises will be responsible for exploiting foreign technology? Are there specific enterprises that specialize in exploiting foreign technology?

[Question as retranslated from Russian] By whom and how is the decision made to purchase foreign technology or to begin scientific research and development in the USSR? What are the bases on which such decisions are made? Who has the right to make the final selection of the supplier of the required technology, and on what bases is this decision made? Who decides which enterprises will bear the responsibility for exploiting foreign technology? Are there special enterprises that engage in the exploitation of foreign equipment?

[Answer] The decision to buy foreign technology or to begin research and development in the USSR is made by the Government of the USSR on the basis of proposals submitted by the ministries and departments of the USSR and the Councils of Ministers of the union republics, and the findings on that proposals that are made by Gksplan USSR and the GANT. The choice of a supplier of foreign technology is determined on the basis of the proposals of the branch ministry.

The question of which enterprises will bear the responsibility for the exploitation of the foreign technology is resolved by the ministry for which that technology is being acquired.

At many enterprises in the USSR, equipment that was purchased abroad is being successfully exploited, and those enterprises have close ties with the suppliers of that equipment.

Section III. The Role of Industrial Enterprises

[Question] 3.1.1. For R&D projects initiated within an enterprise (product improvement, improved manufacturing techniques, new product design, etc.), how is the decision to initiate such an effort made? Does the enterprise manager who wishes to initiate an R&D project require approval by higher authorities?

[Question as retranslated from Russian] How are the decisions made to initiate scientific-research projects at an enterprise (improvement of individual types of output, improvement of production methods, the planning of new types of output)? Is it necessary for the enterprise manager who has an interest in initiating a scientific-research project to obtain the consent of higher authorities?

[Answer] In conformity with the Statute Governing the Socialist Enterprise, the improvement of output, the improvement of technology is one of the basic duties of the enterprise. Therefore the decision to carry out scientific-research projects to improve the methods of production and to develop new types of output is made by the enterprise itself. It is financed by that enterprise's funds.

Assignments for the fulfillment of scientific-research projects are considered in the enterprise plan, after the approval of which the enterprise begins to implement the planned research program. In the event that the enterprise does not have at its disposal sufficient funds for the carrying out of the scientific-research work that it needs, it appeals to superior administrative echelons (association, ministry, etc.), which make the decision concerning the desirability of fulfilling the scientific-research projects planned by the enterprise, and determine the sources of their financing.

[Question] 3.1.2. How is the project financed? What monitoring processes are employed as the project continues? Does the plan for the project include specific goals to be met at specific times? Are there decision points at which management consciously determines whether the project should continue or be terminated?

[Question as retranslated from Russian] How is the project financed? What methods of administration are used during the carrying out of the projects? What specific goals? Are deadlines for their fulfillment defined? Are there definite stages at which management consciously decides whether the development of the project should be continued or terminated?

[Answer] The scientific-research projects conducted by an enterprise are financed either with the funds of the enterprise itself, or with the funds allocated by the superior organization.

In the enterprise plan, there is a definition of the specific goals of the scientific-research project, the stages of operations, the volumes of financing, and the material-technical support of those operations.

The All-Union Association supervises the fulfillment of these operations; and, on the basis of the results of fulfillment of definite stages of the operations, makes decisions concerning the desirability of continuing them.

[Question] 3.1.3. What is the experience on initial cost estimates compared to final costs? (In one well-managed U.S. technical firm this ratio is about 2 to 1.)

[Question as retranslated from Russian] What is the experience that the Soviet side has had with respect to the initial cost estimates as compared with the actual expenditures. In a certain well-managed U.S. firm this ratio is 2 to 1.

[Answer] At industrial enterprises and associations, the preliminary financial-estimate computation for the carrying out of scientific-research and experimental-design operations, as a rule, is not very different from the actual expenditures. This situation can be explained by the fact that the industrial enterprises do not undertake the carrying out of operations that have a large degree of risk or indefiniteness about the expected results. But at the same time there have been instances when the actual expenditures exceed the computed ones.

[Question] 3.1.4. Are there any market surveys to determine the potential demand for the product to be developed?

[Question as retranslated from Russian] Are there any market surveys to determine the potential demand for those types of output which are supposed to be developed?

[Answer] The enterprise determines the possible demand for its output and its potential customers. Surveys are drawn up for the possible consumers of consumer goods and the extent of the consumption; and republic, oblast, and inter-oblast fairs are arranged, at which a determination is made of the orders for the output of individual enterprises.

The question of the determination of need is coordinated within the confines of the branch (sub-branch) by the All-Union Industrial Association and the lead scientific-research institute.

The existence of information concerning the need for a new type of output is one of the basic conditions for the making of a decision to produce a new type of output.

The need for new types of industrial output is determined during the development of the plans, on the basis of orders and requisitions made by consumer organizations.

[Question] 3.2. Roughly what proportion of all product innovations originate in enterprises, and what proportion are they ordered to introduce by the ministry? Are there any data on this?

[Question as retranslated from Russian] Approximately what part of all innovations during the production of output originate at the enterprises, and what part are introduced? Are there any data on this question?

[Answer] It is very difficult to provide an answer to this question, because not a single innovation during the production of output is carried out without the participation of the enterprise. The enterprise participates in developing the technology of production of the new type of output; orders or manufactures the technological equipment and fittings necessary for the production of that output; taking into consideration its own production peculiarities, makes corresponding changes and additions to the proposed technology; trains the workers and engineering-technical personnel to produce the new type of output; etc.

On the other hand, the enterprises very frequently make use of the results of projects carried out by the scientific institutions of institutions of higher learning, design bureaus, and other organizations for purposes of improving the output being produced by them and of improving the technology of production.

[Question] 3.3. Innovators often find that they have to use different quantities and types of materials than those used in the prototype model. Since their inputs were planned on the basis of the model, this can create difficulties. Are there any special provisions for innovators to get materials outside of the system of material-technical supply?

[Question as retranslated from Russian] Innovators often find that they have to use quantities and types of materials that differ from those that were used for the prototype model. Since their input parameters are planned on the basis of the model, this can create difficulties. Are special conditions created to allow innovators to be provided with materials outside of the system of material-technical supply?

[Answer] Very frequently, during the creation of models of new types of output, use is made of new types of materials or components the production of which has not yet been assimilated by industry. Therefore, if, when considering the question of the production of a new type of output, no decision is made concerning the assimilation of the required new types of materials or components, the manufacturer plan is forced to use those that are available. As a result of the conditions that prevail, the technical parameters of the newly assimilated types of output can differ from those that were planned and the consumers might reject that "new" output, and continue to order the old.

In order to prevent such situations, when questions concerning the production of new types of output are being resolved by the planning agencies, decisions are simultaneously made concerning the production of the new types of materials and components that are necessary for assuring the production of the new types of output.

[Question] 3.4. One pattern of innovation in the U.S. is "innovation by invasion," in which a progressive industry like petrochemicals "invades" the market of conservative industries like textiles. Are Soviet ministries and enterprises encouraged to try to sell their new products to the customers of other enterprises and ministries? Are enterprises encouraged to spend funds for market surveys and for persuading potential adopters to try their new products? Who bears the responsibility if the sales of a new product are lagging, the producing enterprise or the ministry's "glavsbyt"?

[Question as retranslated from Russian] One of the methods of introducing an invention in the United States is "innovation by invasion," in which a progressive branch of industry, such as the petrochemical branch, "invades" the markets of such conservative branches as the textile branch. Are Soviet ministries and enterprises supported in their attempt to sell their new output to customers from other enterprises and ministries? Are enterprises encouraged to use funds to prepare market surveys or to convince potential consumers that they should test their new output? Who bears the responsibility if the sales of the new types of output are lagging -- the producer enterprise or the ministry's "glavsbyt"?

[Answer] In our country "innovation by invasion" is carried out on a scale of the entire national economy, when, in the State Plan, the assignments for the production and use of new materials and equipment are established for the ministries and departments.

It should also be noted that each ministry and its enterprises, as a rule, have a self-interestedness in expanding the volumes of deliveries of the new output.

In the enterprise's expenses for the production of output, consideration is made of the costs to test that output, as incurred by the consumer.

The consideration of the needs for various types of output is one of the conditions of planning. Therefore, the production of new types of output is planned with a consideration of their consumption.

Of course, there might be situations when the sales of new types of industrial output are lagging for various reasons (lack of preparation by the customer; deviation from specifications; etc.). Then, in each individual instance, the reasons for the delay in sales are ascertained and specific steps are taken to eliminate them.

If there are errors in the quality of the output, the responsibility is borne by the manufacturer enterprise.

[Question] 3.5. The published sources describe some of the contents of the ministry manuals ("metodiki") for setting prices on new products, but many of the details are not available. For example, in setting prices on "analogue" products, who decides whether the wholesale price will be closer to the "upper limit" price or the "lower limit" price? Could we see some sample price catalogues and manuals for setting prices? How are R&D costs accounted for in pricing new products? Are they charged to the first year of production, or capitalized over several years (how many)? Does it make a difference whether the product is initially assigned a temporary or permanent price?

[Question as retranslated from Russian] The published sources describe the contents of the "metodiki" for the establishment of prices of new types of output produced by certain ministries, but many details are absent. For example, in setting prices for "analogous" output, who decides whether the wholesale prices will be closer to the "upper limit" or to the "lower limit"? Could we see samples of price reference aids or "metodiki" for price-setting? How are the expenditures for scientific research and development taken into consideration when setting prices for new types of output? Are they compensated over a period of several years (how many)? Is there a difference between output for which a temporary price is set and output for which a permanent price is set?

[Answer] Questions of price-setting for industrial output pertain to the competency of the State Committee on Prices, Council of Ministers USSR. As a rule, the extent of the price assigned represents the sum of the expenses incurred by the enterprise that produces the output (the enterprise cost of production), plus a small mark-up, which takes into consideration the profitability of the branch.

The enterprise cost of production of industrial output is the enterprise's (association's) current expenditures, expressed in monetary form, for the production and sale of that output. Expenditures for production form the production (factory-plant) enterprise cost of production of industrial output, and expenditures for production and sales form the complete enterprise cost of production of industrial output.

Enterprise cost of production is made up of the expenditures linked with the use, in the process of production of industrial output, of fixed assets, raw and other materials, fuel and power, labor, and other expenditures for its production and sale.

In conformity with this, the enterprise cost of production of output includes:

a) expenditures for the preparation of production: search, prospecting, and preparation for use of natural resources; preparatory operations in



the extractive branches of industry; the assimilation of the production of new types of output; etc.;

b) expenditures directly linked with the production of output, and influenced by the technology and organization of production, including administrative expenses;

c) expenditures linked with the improvement of technology and the organization of production, which is carried out in the course of the production process (other than expenditures incurred against capital investments), with the improvement of the quality of output, with the increasing of its reliability, service life, and other operating properties;

d) expenditures to improve the working conditions and safety measures: to increase the proficiency level of the workers in production;

e) sales expenses, other than those which, on the basis of the delivery terms, are compensated by the purchasers in excess of the price of the corresponding output.

Expenditures for the preparation and assimilation of the production of new types of output and technological processes can be included in the enterprise cost of production either directly, or in the form of deductions to be deposited to special funds. With the direct inclusion of these expenses in the enterprise cost of production, their overall sum is distributed proportionally to the volume of output produced during the course of no more than a two-year period. The procedure for the formation and use of special funds for the assimilation of new technology are regulated by special instruction manuals.

The expenditures included in the item "Expenses for the preparation and assimilation of production" include:

- expenses for the assimilation of new enterprise, production entities, shops, and assemblies (start-up expenses);
- expenses for the preparation and assimilation of the production of new types of output and new technological processes;
- expenses for preparatory operations in the extractive industry;
- deductions to be paid into the fund for the assimilation of new technology;
- deductions to be paid into the incentive-payments fund for the creation and assimilation of new technology.

Expenditures for the preparation and assimilation of the production of new types of output and new technological processes include the expenditures for planning and designing, as well as for the development of the technological process of manufacture of the new article; for the re-installation and retooling of the equipment; and the cost of the article that is to be used as the model. The following is a typical nomenclature listing of the items representing the expenses for the assimilation of the production of new types of output and new technological processes.

Nr	Name of expenditure item	Description and content of the expenses
1	2	3
1	Planning and designing of new article; development of technological process of its manufacture	Expenditures for the designing, planning, development of the technological process of manufacture and the preparation of the technical documentation for the new article: basic and additional wages and deductions for social security of designers, technologists, draftsmen, copiers, and other workers engaged in the enumerated operations
2	Planning of tool fittings and the development of the technological process of their manufacture	Expenditures for the designing, planning, and development of the technological process of manufacture of the tool fittings (dies, templates, models, tools, press-forms, and special-purpose attachments): basic and additional wages and deductions for social security of enterprise workers engaged in the enumerated operations.
3	Development and formulation of expenditures norm lists	Basic and additional wages and social-security deductions for enterprise workers and other expenditures for the development of norms for labor expenditures and wages, the expenditure of materials, fuel, tools, for the preparation of the normative estimates for the enterprise cost of production of the article, etc.

- 5 Testing of materials, semi-finished goods, tools, and attachments for the production of new articles
- 6 Replanning, re-installation, and fitting of equipment
- 7 Manufacture of the experimental model (consignment) of the article
- 8 Development and assimilation of the new plant technology of the processes of production
- 9 Testing, at the manufacturer enterprises and by the consumers, of the experimental consignment of output
- 10 Carrying out of tests, experiments, research studies, the maintenance of general-plant laboratories, expenses for inventions and technical improvements
- Expenditures of shops and laboratories for the study, selection, and testing of samples of materials, semi-finished goods, tools and attachments to be used during the production of the new article
- Expenditures for the replanning of shops, for the re-installation and fitting of equipment (with the exception of expenditures of a capital nature), which are carried out as a result of the organization of production of the new article
- Expenditures for the manufacture of the experimental model (consignment) of articles, less the proceeds from its sale
- Expenditures for the planning of the new plant technology of the processes of production and the preparation of the technical documentation for the new technological process.  
Expenditures linked with the assimilation of the new plant technology of the processes of production.
- Expenditures for the testing, at the manufacturer enterprises and by the consumers, of the experimental consignment of output obtained by the new technology
- Expenditures for tests, experiments, and research studies which are intended to determine the quality of the materials and semifinished goods arriving at the enterprise, the quality of raw materials of own production, of own-manufactured semifinished goods, for checking to ensure the observance of the established

technological products, for the application of new types of materials and semifinished goods, new technological processes, etc.; expenditures for reagents and other materials, semifinished goods, and finished articles for laboratory analyses, experiments, samples, research works, tests, and other operations carried out by outside organizations; basic and additional wages and social-security deductions for workers in general-plant laboratories; repayment of wear and tear of relatively inexpensive objects and instruments used in laboratories and technical control divisions, and the repair of those objects and instruments; expenses for inventions, technical improvements, and work-improvement suggestions of a general-plant nature (not financed from the state budget); compensation to originators; payment to boards of experts; manufacture of models and prototypes; testing of inventions and technical improvements; deductions to be paid into the incentive-payments fund to aid the introduction of invention and work-improvement suggestions, from the sum of compensations paid out. Expenditures for research operations carried out by the efforts of the enterprise personnel and providing a benefit within the year being planned.

The expenses for the preparation and assimilation of production of new types of output and new technological products do not include:

- expenditures linked with a partial change in the design of an article, the modernization of individual parts or assemblies, or the partial reconsideration of the technological process;
- expenditures compensated from the fund for assimilation of new technology (overexpenditure of funds as against the estimate is not compensated from the fund, but is included in the enterprise cost of production for the particular item);

-- expenditures incurred against capital investments;

-- cost of operations carried out by scientific-research, planning, and designing organizations against budgetary appropriations.

Expenditures linked with the assimilation of new types of output which are not compensated from the fund for the assimilation of new technology are included in the expenses of future periods and are subsequently included in the enterprise cost of production of the articles by parts within an established period (as a rule, not more than two-year) from the beginning of their series or mass production, on the basis of the estimate for those expenditures and the amount of output produced during that period of time.

Deductions to be paid into the fund for the assimilation of new technology are included in the planned and actual enterprise cost of production of those branches of industry and those types of output for which there has been established a procedure for the formation of a new-technology fund intended to compensate the expenses for the preparation and assimilation of new types of output and new technological processes.

Deductions or expenses for scientific-research and experimental projects are taken into consideration in the item "Other production expenses," in which consideration is also taken of the expenditures linked with the production of individual articles or types of output (for the carrying out of special episodic tests, for the payment of boards of experts, consultative bodies, etc.), as well as expenditures which, as a rule, are planned and taken into consideration as part of shop and general-plant expenses (expenses for the maintenance of technical bureaus and divisions, laboratories, etc.).

As for questions of the setting of wholesale prices for "analogous" output, the question of whether its value will be closer to the "upper limit" or the "lower limit" is resolved by the State Committee on Prices, Council of Ministers USSR, and its agencies depending upon the capabilities of the enterprises producing the particular type of output to assure the consumers' demands.

Temporary wholesale prices are established only for the period of assimilation of the series production of new articles and materials, the production of which is being organized in the Soviet Union for the first time and which do not have any analogues among the output being produced in the USSR. After the expiration of the effective period of the temporary prices, permanent wholesale prices are established.

[Question] 3.6. If the introduction of a new product reduces the enterprise's average profit rate, does the enterprise lose material incentive funds? Does it make a difference whether the new product is provided for in the plan or whether it is introduced in the course of the plan year? Can the planned profit target be revised downward for an innovating enterprise?

[Question as retranslated] Does the enterprise lose material-incentive funds if the introduction into production of a new type of output reduces the average profit norm of the enterprise? Is there a difference between the situation when the production of a new type of output is provided in the plan and when the introduction into production of a new type of output occurs within the course of fulfillment of the annual plan? Can the planned, tentative profit norm for the innovator enterprise be reconsidered?

[Answer] Since the extent of the material-incentive fund at the enterprise is proportional to the value of the output sold, in the event that the enterprise has begun to produce cheaper output in the same quantity, the size of the deductions paid into the material-incentive funds is reduced. In such instances the superior agencies compensate the enterprise for those losses, by drawing at first a centralized material-incentive fund.

Of course, if the enterprise carries out the production of a new type of output that is stipulated by the plan, it has at its disposal all the necessary financial and material-technical means for the fulfillment of the planned program. In this instance the higher organizations can reconsider the planned profitability norm. But if this measure is fulfilled in excess of the plan established for the enterprise, it must locate the funds necessary for the production of the new output.

[Question] 3.7. If a scientist or engineer invents a new product or a new process that is outside the mission of the enterprise that employs him, what are the means open to him to interest other organizations in his new idea? What incentives are there for the inventor in this case to attempt to exploit his idea?

[Question as retranslated from Russian] If a scientist or engineer invents a new type of output or a new process which lies outside the competence of the enterprise where he is working, what means can he use to interest other organizations in his new idea? What bonus payments [sic] [premiya] may the inventor receive in the event that he attempts to develop a new idea?

[Answer] The legislation that is in effect grants inventors the right to participate in the preparation of their inventions for use: in the development of technical documentation, the manufacture and testing of experimental models, and the organization of production.

State enterprises that have accepted an invention for use can take advantage of the technical documentation or model manufactured by the originator, or can commission the originator to carry out such work. In the event of the fulfillment of this work by the originator

other than as part of his official duties, the enterprise is required to conclude with the originator an agreement that provides for payment of the work and compensation of the expenses incurred in preparing the documentation or model. The sums defined by this agreement are paid to the originator irrespective of the remuneration for the use of the invention.

In conformity with the Statute on Discoveries, Inventions, and Work-Improvement Suggestions which is in effect in the Soviet Union, the exclusive right for the use of inventions belongs to the state. The Soviet state assumes the concern for the sale of the inventions through state, cooperative, and social enterprises.

For use of the invention, the originator (originators) is (are) paid monetary remuneration if the invention is:

- used in the national economy of the USSR;
- used in documentation transmitted to other countries by way of economic and scientific-technical collaboration;
- used at projects that are being constructed by USSR enterprises and organizations abroad by way of the rendering of technical assistance to foreign countries;
- sold through the sale of licenses abroad.

The remuneration for the use of the invention is computed separately for each of the justifications indicated above.

The maximum amount of remuneration for a single invention cannot exceed 20,000 rubles.

[Question] 3.8. How is R&D organized within the enterprise? Is there a group whose sole responsibility is research and development, or are production personnel assigned to R&D projects as they arise? Does this pattern differ from enterprise to enterprise? What special incentives do R&D engineers and scientists have for successful completion of a project?

[Question as retranslated from Russian] How is the carrying out of research and development at the enterprise organized? Is there a group whose sole duty is the carrying out of scientific research and development, or are the production personnel assigned to scientific-research projects as they arise? Does the system adopted at one enterprise differ from the system adopted at another one? What special bonuses do scientists and engineers receive for the successful completion of a project?

[Answer] For the conducting of research and development, the enterprise can have, within its makeup, laboratories, design bureaus, and sometimes also scientific-research institutes.

The enterprise also, in conformity with the legislation that is in effect, has the right to conclude, with scientific-research, planning, and designing organizations and with higher educational institutions, contracts for the development of new equipment and technology of production, plays for the modernization of the enterprise, its shops and sections, divisions and farms, the modernization of equipment, the mechanization and automation of production processes, and the organization of labor and production.

Expenses for the indicated operations are made against the enterprise funds, as well as against bank credit.

The organization of scientific research projects at industrial enterprises, to a considerable degree, is determined by the specifics of the branch and the output that is produced by the particular enterprise.

In recognition of the fulfillment of assignments for fulfillment of scientific-research and experimental-design projects for the creation of new technology, enterprise workers are given bonuses from the material-incentives fund, depending upon the economic benefit derived from its introduction.

[Question] 3.9 In the U.S., development and production efforts are generally well coordinated. Commercial aircraft production companies, for instance, have their own design teams. There are several advantages to this arrangement. Technological advances are easily implemented into aircraft designs. Development personnel are close at hand to provide implementation support for new technology items. Information channels are relatively short, allowing development and production personnel to exchange ideas and to mutually attack design and production problems. One disadvantage in this organizational set-up is that advanced technology is forced into all aspects of new aircraft. Furthermore, changes are continually made to an aircraft over the life of its production run. Cost analysts believe that this reluctance to freeze production designs increases costs significantly. Do the Soviets implement technology differently? If some organizational aspects of the Soviet development and production process were implemented in the U.S., would savings in time and manpower result?



[Answer] In the United States, scientific-research projects, developments (scientific-research and experimental-design projects), and production operations are usually well coordinated. For example, companies that produce passenger aircraft have their own planning and designing groups. An organization of this type has a number of advantages. The achievements of technology are easily introduced during the planning of new aircraft. The personnel engaged in the planning and designing operations are close at hand and provide support during the introduction of new technology. Information channels are relatively short, allowing the personnel engaged in scientific-research and experimental-design projects to exchange their ideas and to join together in overcoming the problems that arise during planning and production. One disadvantage of this organizational structure is that modern technology is introduced by force into all aspects of the new model (of the aircraft) [presumable omission] changes are constantly made. A cost analysis has shown that this reluctance to continue the production of an already started model considerably increases the cost of production. Is new technology introduced differently in the USSR? Are there any aspects in the process of scientific-research projects and development which is accepted in the USSR which, if introduced into the United States, would result in a saving in time and manpower resources?

[Answer] The introduction of new technology is carried out in our country by various means, but they all find expression in the assignments of the State Plan for the Development of the National Economy of the USSR, which define the content, volumes, and deadlines for specific projects.

As for the development of such new complex types of equipment as passenger aircraft, rolling mills, automatic lines, etc., these operations are carried out by scientific-research and design organizations in close contact with the plants producing the basic equipment and components, in conformity with the approved plans [for the organizations] responsible for the fulfillment of the assignments entrusted to them for the creation by them of a new model of component article.

During the organization of production of new models of complex technology, the following sequence of operations is generally employed:

- 1) preparation of draft version of assignments for fulfillment of operations the carrying out of which is necessary for the creation of the particular model of complex technology;
- 2) after coordination, this draft is submitted for the approval of the Council of Ministers, USSR;
- 3) the assignments approved by the government are included for fulfillment in the work plans of the ministries, departments, and the appropriate organizations.

Obviously, both in the process of fulfillment of planned assignments for new technology, and moreover in the process of assimilation of new types of production, there arise situations of a forced reconsideration of the previously planned program, which are linked with the necessity of additional scientific-technical developments. However, under conditions of the planned economy, the way out of such situations is facilitated by the possibility of maneuvering, by means of drawing upon the services of additional scientific-research and design organizations, and, if need be, new enterprises, production associations, etc.

As for the question of the possibility of saving time and manpower resources in the United States as a result of the use of certain aspects of the Soviet organization of research, development, and production, or, conversely, that question requires special study in each specific instance, including reliance upon specialists.

#### Section IV. The role of higher education establishments and the Academy of Sciences

[Question] 4.1.1. What place do higher education establishments fill in the national R&D effort?

[Question as retranslated from Russian] What place do institutions of higher learning occupy in the state-wide system of scientific-research projects and developments?

[Answer] The basic tasks of the scientific-research work performed by the institutions of higher learning are: the development of theoretical problems; the resolution of the most vital problems for the national economy; the study and generalization of the experience of communist construction; the creation of textbooks and teaching aids; the fulfillment of research projects of a scientific-methodology nature. Institutions of higher learning participate in the introduction into the national economy of the results of their research, propagandize the achievements of science, technology, and culture.

The guidance of scientific-research work in the higher schools and the experimental-design work in secondary special educational institutions is carried out by the Ministry of Higher and Secondary Special Education USSR. In the field of administration of scientific activity, the Ministry of Higher and Secondary Special Education USSR, in addition to the functions stipulated by the General Statute Governing the Ministries of the USSR, develops and carries out measures to improve the scientific-research work in institutions of higher learning, assures the broad involvement of the professor and instructor staff of the institutions of higher learning in the conducting of scientific research for the national economy, and take steps for the practical use of the results of that research; jointly with other departments, resolves questions of opening or closing the scientific-research subdivisions of institutions of higher learning.

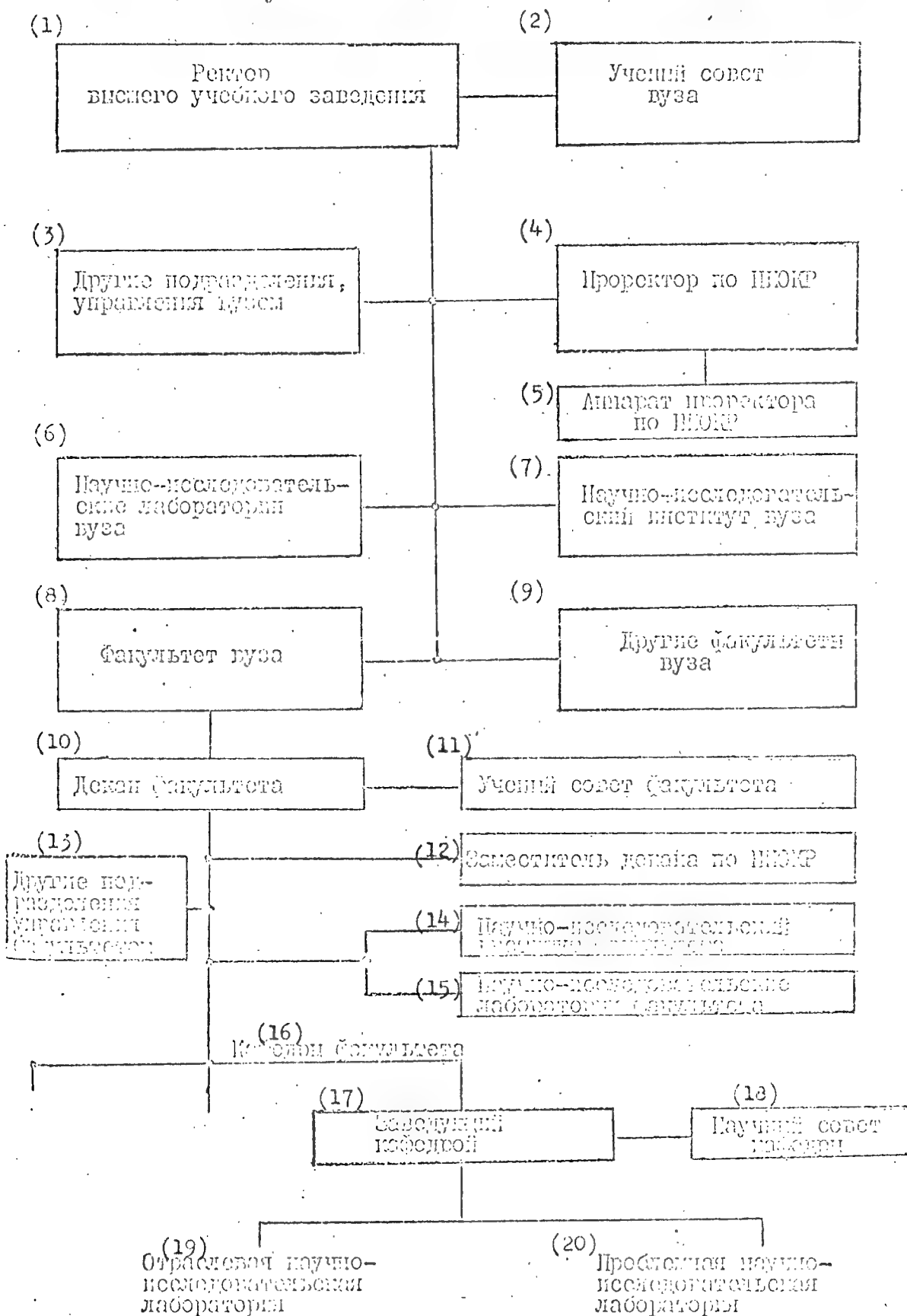
An important peculiarity of the scientific-research work performed by institutions of higher learning is the possibility for those institutions, thanks to their diversity of areas of specialization and the availability (especially in the scientific collectives of universities and polytechnical institutions) of a complex of specialists representing a large number of scientific disciplines, to carry out major, fundamental research, including in those areas where various branches of knowledge overlap. Another peculiarity of science at institutions of higher learning is the circumstance that it has a constant influx of fresh forces, the capability of selecting talented young people.

The statute that governs institutions of higher learning entrust to the professor and instructor staff and the scientific staff of the institution of higher learning, insofar as scientific-research work is concerned, the duty of carrying out scientific research and of participating in the introduction of the results of that research into the national economy; the duty of improving their own theoretical knowledge, practical experience, methods of conducting scientific work, and their pedagogical skills; of training scientific-pedagogic personnel; and of disseminating scientific and political knowledge among the public.

The basic structural subdivision of the institution of higher learning, carrying out both educational and scientific-research work, is the department. It is headed by a department head; the staff of a department includes professors, assistant professors, docents, instructors, scientific workers, graduate students, etc. As a rule, the departments are engaged in basic, fundamental research. This is the result of the specifics of the educational process: the training of highly qualified specialists can be successful only in the event that the institutions of higher learning carry out research on modern fundamental problems of science.

In addition to the departments, the institutions of higher learning have scientific-research divisions, sectors, laboratories, clinics, educational-training and experimental farms, experimental shops, data-processing centers, and other structural subdivisions that carry out scientific and designing-and-planning work. These special scientific-research subdivisions at institutions of higher learning include scientific-research institutes, and problem-oriented and branch scientific-research laboratories.

The problem-oriented laboratories are created for the execution of major vital scientific-research and experimental-design projects. They carry out theoretical and experimental research along the direction approved for each of them.



[For key, see next page]

Key: 21. General diagram showing organization and administration of scientific-research and experimental-design projects at an institution of higher learning

1. Director of higher educational institution
2. Learned Council of higher educational institution
3. Other subdivisions of administration of higher educational institution
4. Pro-rector for scientific-research and experimental-design projects.
5. Apparatus of pro-rector for scientific-research and experimental-design projects
6. Scientific-research laboratories of higher educational institution
7. Scientific-research institute of higher educational institution
8. School of higher educational institution
9. Other schools of higher educational institution
10. Dean of school
11. Learned Council of school
12. Vice-dean for scientific-research and experimental-design projects
13. Other subdivisions of administration of higher educational institution
14. Scientific-research institute of department
15. Scientific-research laboratories of department
16. Departments of school
17. Department head
18. Scientific Council of department
19. Branch scientific-research laboratory
20. Problem-oriented scientific-research laboratory

The branch laboratories carry out specific vital scientific-research and experimental-design projects advanced by the departments, organizations, and enterprises that have a self-interestedness in them. The branch laboratories carry out research in the creation of new materials, equipment, and technology that directly contribute to the technical-economic progress of production.

The role of the scientific-research institutes and laboratories is difficult to overestimate. Such scientific institutions as the institutes of nuclear physics and mechanics, the State Astronomic Institute imeni Shternberg -- of Moscow University; the Radiophysical Institute -- of Gor'kiy University; the Scientific-Research Institute of Solid Physics -- of Tomsk University; the Scientific-Research Institute of Powder Metallurgy -- of Belorussian Polytechnical Institute; as well as the problem-oriented laboratories of Leningrad Technological Institute imeni Lensovet, Tomsk and L'vov Polytechnical Institutes, and Kazan', Tashkent,

Kazakh, Tbilisi, Tartu, and Yerevan Universities have been changed into true centers of theoretical, exploratory, comprehensive research projects being carried out with the efforts of specialists in different departments, rather than those of the particular high educational institution only.

The carrying out of scientific-research projects by higher educational institutions on the basis of contracts has received considerable development during recent years. This has become the established form of contact between the higher schools and various branches of the national economy.

The economic contracts concluded between the higher educational institutions and various enterprises and institutions are mutually advantageous. They are beneficial to production in that, for the solution of the tasks confronting them, it is not necessary to create special laboratories, or to select a staff, but makes it possible to involve in that work the already-created, skilled collectives of higher educational institutions, which are capable of carrying out the research on the level of modern science. As for the higher educational institutions, the economic contracts make it possible to expand the front of research being carried out, as a result of topics of a scientific-technical nature. The directors of higher educational institutions have the right to use 75 percent of the sum of the excess of income over expenses for economic-contract projects for the expansion and consolidation of the material-technical base of the higher educational institutions, in excess of the appropriations based on the capital-investment plans.

The coordination of the scientific research being conducted at higher educational institutions is carried out by the Scientific-Technical Council that exists under the Ministry of Higher and Secondary Special Education USSR. That council consists of 40 sections for all the most important branches of science. At the sections of the council, the questions of carrying out research for the basic problems are discussed. Taking part in the work of the sections are more than 500 major scientists at the higher educational institutions, the Academy of Sciences USSR, and the Academies of Sciences of the union republics, the branch scientific-research institutes and organizations.

Of great importance for the development of scientific research in institutions of higher learning and for their coordination are inter-institutional scientific conferences on vital problems in the various branches of knowledge.

In the scientific activities of higher schools, a considerable place is occupied by the student body. For example, in 1971-1972, 796,000 students took active part in scientific-research and design work.

[Question] 4.1.2. To what extent are projects funded on a contract basis by non-academic organizations?

[Question as retranslated from Russian] To what extent are projects that do not pertain to the Academy of Sciences USSR financed?

[Answer] As was previously mentioned, the higher educational institutions take broad participation in the carrying out of fundamental and applied research, with the industrial ministries drawing upon the higher educational institutions for the solution of a large number of practical tasks, and expending for that purpose a large part of their funds that are allocated by them for the carrying out of scientific research on contract.

[Question] 4.2. How do the useful results of academic research get translated to new industrial products or processes? Is this the sole responsibility of the developer? Do representatives from ministries, firms, design institutes, etc. visit higher education establishments as a regular procedure in order to familiarize themselves of possible new scientific and technical results? How are useful results from laboratories of the Academy of Sciences translated into new industrial products or processes? Is there a problem here, and if so, what steps are being taken to solve it?

[Question as retranslated from Russian] How are the useful results of academic scientific research converted into new forms of industrial output or processes? Is this the sole responsibility of the developer? Do representatives from the ministries, firms, planning institutes, etc. visit the higher educational institutions regularly in order to familiarize themselves with the possibilities of obtaining new results in science and technology? How are the useful results obtained in the laboratories of the Academy of Sciences USSR converted into new forms of scientific output or processes? Do any problems arise here, and if so, what steps are taken to resolve them?

[Answer] The state-wide system of implementation of the results of fundamental research in industry which is accepted in the USSR presupposes three basic stages:

- a) the preparation of proposals for the use of the results of scientific research (formulation of results; determination of its innovation, of possible areas of application, of the economic desirability of use); their consideration and the making of the decision concerning use;
- b) the transferral of the results of the scientific research to the appropriate department, which, with the forces of its own institutes, develops new technical models or new technology, and prepares the appropriate technical documentation for production;

c) the assimilation of the new output or the new technology by the production enterprise.

With the organization of projects according to this scheme, the consecutive execution of each stage can lead to a prolongation of the deadlines for the direct use of the scientific results in production. Therefore, in order to eliminate any possible difficulties or obstacles that might arise along the path of introduction, the forms of the direct contacts between the scientific institutions of the Academy, the branch scientific-research institutes, and the production enterprises are improved constantly.

In this instance it is easier to accept new scientific ideas and the results of fundamental research, and, to a large extent, the difficulties of resolving questions of financing and material supply are eliminated and there is a noticeable reduction in the deadlines for the use of scientific results.

In addition to reducing the deadlines for the introduction of the achievements of science, direct ties with industry contribute to the acceleration of the growth of skilled personnel at the enterprises. The close and creative collaboration between the scientists and the workers at the industrial enterprise, on the one hand, opens up large opportunities for the penetration of scientific ideas into industry, and, on the other hand, assures that the scientists will devote more complete attention to the needs of industry. This process is reinforced by systematic work of sending apprentices from industry to academic institutes and the sending of scientists on detached duty to branch institutes and plant laboratories for the giving of lectures and the conducting of consultative sessions.

[Question] 4.3. What influences operate to set the pattern of academic research? (For example, in the U.S., a self-selection of projects, but funding tied to federal view of national needs.) To what extent are research tasks assigned to laboratories of the Academy of Sciences? Who has the authority to make such assignments? Can the assignment be made independently of the laboratory's consent?

[Question as retranslated from Russian] What levers are used to establish the pattern for the carrying out of academic scientific research? (For example, in the United States, there is the right of independent selection of projects, but financing depends upon the federal point of view concerning national needs.) How are the scientific assignments of the laboratories of the Academy of Sciences determined? Who has the right to give such assignments irrespective of the laboratory's consent?

[Answer] The five-year plans for scientific research in the field of the natural and social sciences are developed by the divisions of the Academy of Sciences USSR, and, after consideration by the sections,



are submitted for the approval of the Presidium of the Academy of Sciences. The divisions, jointly with the scientific councils existing under the Academy of Sciences, develop the coordination plans for the problems in the natural and social sciences, as well as for scientific-technical problems.

The scientific institutions of the Academy of Sciences draw up annual topical plans for their projects on the basis of the five-year plans for assignments stipulated in the coordination plans, as well as the recommendations of the scientific councils, and the proposals of the scientific collectives and individual scientists. The director element and the learned council of the institute consider the proposals for the establishment of new research projects. Scientists take the broadest participation in the advancement of research projects: through the institute's learned council, director element, scientific council, division, and Presidium of the Academy of Sciences. The procedure for the consideration of research projects is typified by the joint nature of their evaluation, with the broad inclusion of experts at every stage of consideration. The financing of new projects is carried out through the institutes, inasmuch as the director element is the distributor of the credit and resolves all the questions linked with the distribution of funds. In the event of necessity, the institute's director element can request additional appropriations.

The role of the workers of the planning agencies during the formulation of the programs and projects of fundamental research lies basically in the coordination of the assignments with the scientific institutions, and also in the coordination of the research projects.

The formation of the institute's subject matter lies within the competency of the director and the learned council. The plan financed from the budget includes only those topics whose scientific importance and future prospects are substantiated with sufficient conviction by the scientists who have originated the proposals.

The selection of a particular scientific institution for the carrying out of the planned research is made by the planning agencies by means of:

- the determination of the list of organizations carrying out the appropriate fundamental research, and the specialization of whose scientific activity is closest to the projects being newly planned;
- the evaluation of the scientific personnel and the material-technical base of those organizations, and the determination of the narrower circle of possible executors;
- the evaluation of the possibility of fulfillment of the assignment by the organization.

This type of analysis is carried out by the scientific councils for problems of the natural and social sciences during the drawing up of coordination plans for fundamental research.

The question of the carrying out of research for various scientific assignments is resolved on the basis of coordination with the organization to which it is being proposed to entrust the fulfillment of the planned projects.

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